SERIE
REFORMAS ECONÓMICAS 36

CHANGES IN THE DISTRIBUTION OF INCOME AND THE NEW ECONOMIC MODEL IN COLOMBIA

Mauricio Cárdenas

Raquel Bernal

LC/L.1227
November 1999

This document was financed by Ford Fundation and prepared by Mauricio Cárdenas and Raquel Bernal, consultants for the project "Growth, Employment and Equity: Latin America in the 1990s" (HOL/97/6034). The views expressed in this document, which has been reproduced without formal editing, are those of the authors and do not necessarily reflect the views of the Organization.

CONTENTS

ABSTRACT

This paper has analyzed the changes in the distribution of income in Colombia since 1976 using data for urban economy (seven largest metropolitan areas) and for the manufacturing sector. Evidence is shown that the structural reforms that took place in the early 1990s have been related to higher income concentration in Colombia, where levels of inequality were already impressively high. The results suggest that both trade liberalization and skill complementary technological change have a positive impact on skill premiums.

The evidence presented suggests that skill complementary technological change has been a key force behind the recent increase in the relative demand for more-educated workers. Much of the change in skill intensity has taken place within specific industries, rather than involving large reallocations between sectors. Trade reform has not resulted in a greater expansion of skill intensive sectors relative to unskilled intensive sectors. Quite the contrary, trade liberalization and other reforms, which lowered the user cost of capital and relaxed liquidity constraints, facilitated investment in skill complementary technologies within all sectors of production. Further evidence in this direction is provided by the fact that the largest increases in the relative earnings of the more educated workers took place in the non-traded sectors. The results suggest that both trade liberalization and skill complementary technological change have a positive impact on skill premiums.

As the evidence presented in this paper shows, the structural reforms have been related to higher income concentration in Colombia, a country with already impressively high levels of inequality. For this reason, a better understanding of the relationship between the reforms and distribution is crucial to assess the future of the full reform agenda. Obviously this process has to be consistent with higher levels of growth, lower poverty and more equitable distribution of income.

I. INTRODUCTION

Colombia is an excellent study case to analyze the effects of the structural reforms on income distribution and labor markets. Between 1991 and 1994 a comprehensive package of reforms was implemented including trade liberalization complemented by an active free-trade agreement program. Likewise, the package included other typical components among which we can count labor market reform (1990), foreign investment reform (1991), financial market reform (1991), exchange rate regime reform (1991) and pension system reform (1993). Additionally capital controls were partially eliminated in 1993.

It is clear that important changes have taken place in income distribution since the implementation of structural reforms. In particular, the labor market seems to have had a pivotal role as a transmission mechanism of such effects due to transformations induced by the reforms. Overall, the Colombian labor market has recently been characterized by an increase in skilled labor demand and thus an increase in wage differentials. This fact would, of course, imply a greater concentration of primary income. Similar trends have been observed in industrial economies and developing countries[1]. Recent literature has argued two main reasons for the change in relative labor demand: skill complementary technological changes and trade[2].

As the evidence presented in this paper shows, the structural reforms have been related to higher income concentration in Colombia, a country with already impressively high levels of inequality. For this reason, a better understanding of the relationship between the reforms and distribution is crucial to assess the future of the full reform agenda. Obviously this process has to be consistent with higher levels of growth, lower poverty and more equitable distribution of income.

This paper is structured as follows. Section 2 describes the data used in this document. It analyzes the basic problems of the Household Surveys and the correcting procedures that have been commonly used. Additionally it explains the methodology used in the paper and shows its comparative advantages. Section 3 presents the main stylized facts on income distribution in Colombia between 1976 and 1997 and briefly surveys previous studies on income distribution. Section 4 presents an analysis of decomposition of changes in income concentration over time among various groups of interest. In particular, we analyze specific differences in income dispersion between and within-groups, where groups are defined by education, age, region, gender, occupation and sector. Interestingly, the results indicate that differences in education explain a significant portion of the changes in income distribution in Colombia. Section 5 presents a formal analysis of the effects of macroeconomic and trade liberalization variables on income distribution as measured by the procedure described in Section 2. Section 5 analyzes the recent evolution of wage differentials in Colombia in order to get a better understanding of

primary income distribution. In particular we decompose the relative demand for and supply of skills using a standard procedure. The results indicate that changes in relative demand have been larger than changes in relative supply during the 1990s. Additionally we present some econometric exercises on the determinants of wage differentials. The results suggest that both trade liberalization and skill complementary technological change have a positive impact on skill premiums. The paper ends with a short section of conclusions.

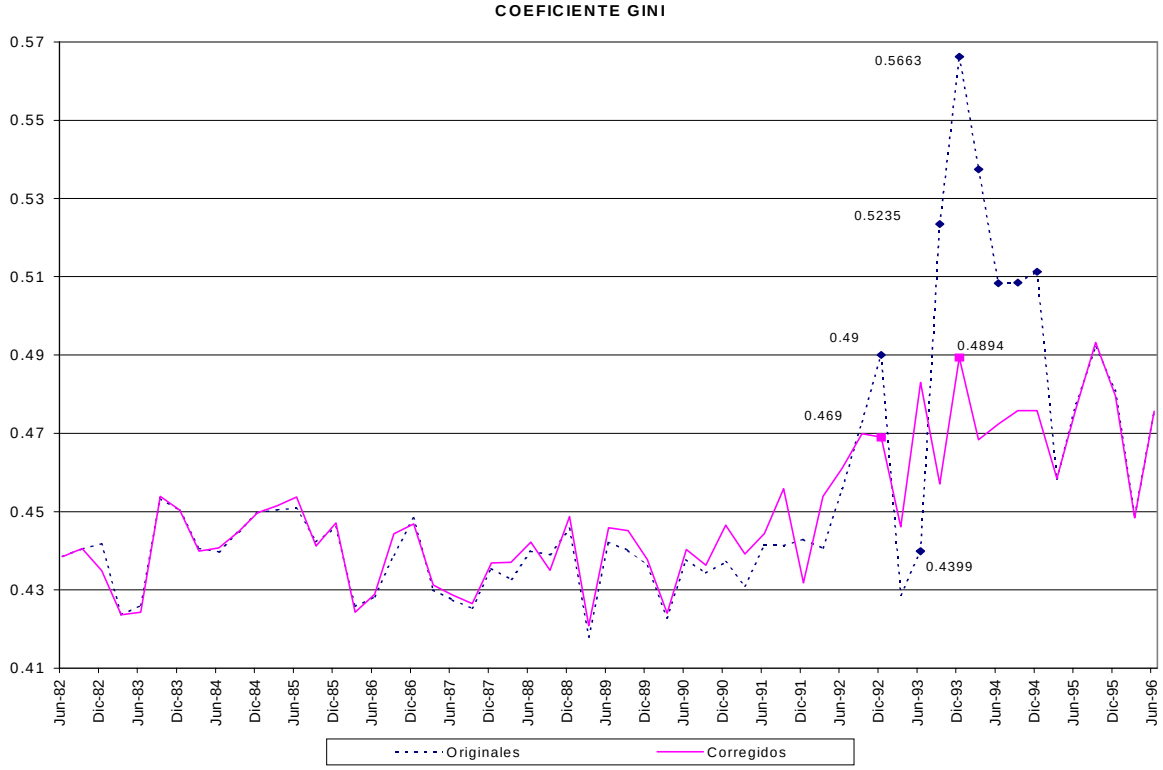
II. THE DATA

1 Corrections of the National Household Surveys

The National Household Survey (NHS) is a quarterly survey conducted since 1976 for the four largest cities, and since 1982 for the seven largest cities. The data is gathered at the household level for all family members. The survey provides information on monetary and non-monetary labor income as well as other income sources; occupational category (private employee, public employee, self-employed, domestic service, employer, and family worker without monetary income); sector of economic activity; gender, and level of education.

These surveys are plagued with methodological problems that have to be solved before an accurate measure of individual or household income distribution is obtained. The main difficulties are related to top-coding problems in reported incomes, and to measurement errors on the part of the surveyors.

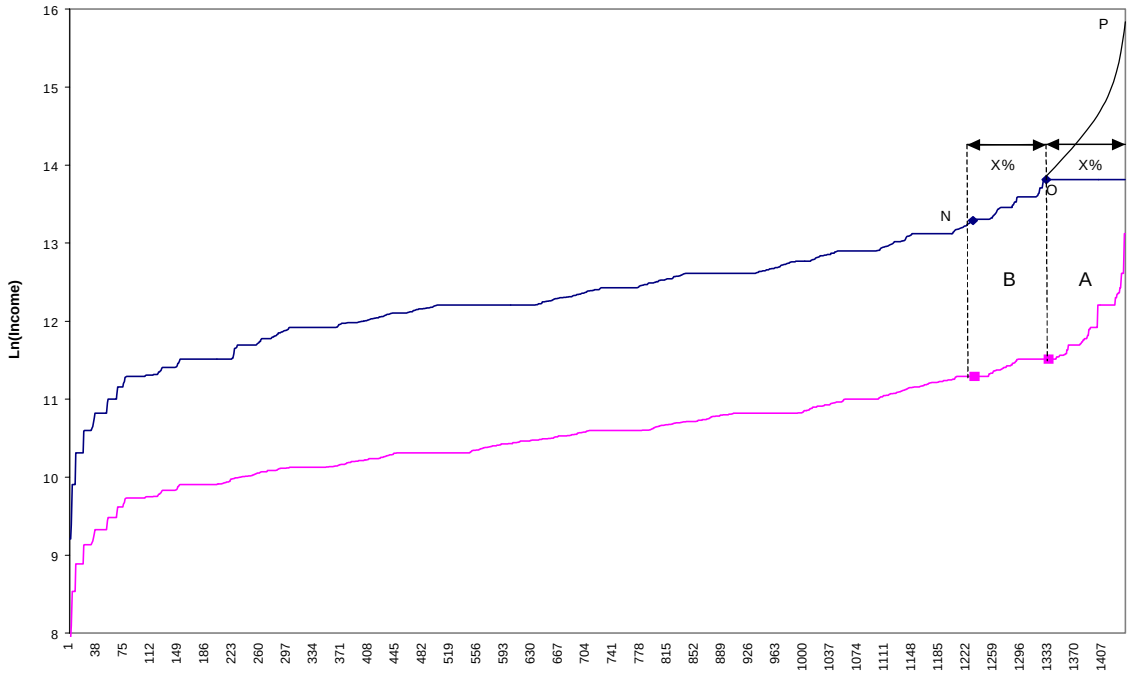
Figure 1



Top coding problems are present in most of the surveys. Until September 1993 the questionnaire allowed up to six digits for monthly incomes, so that higher end incomes were increasingly underestimated[3]. In fact, in June 1993 the number of truncated earnings represented 0.9% of the surveyed population. Since September 1993 seven digit incomes were allowed, but even then a fraction of the surveyed individuals reported the top coded income. It is only since March 1996 that the surveys no longer have limits on the maximum income reported. Several procedures can be used in order to correct for truncation problems. In this paper we use the methodology described in Bernal et al. (1997) which has better statistical properties than alternative procedures as we describe briefly ahead. In addition, many workers report a weekly (or by-weekly) payment of their salary, but express their salary in monthly terms. Occasionally, the monthly salary has been wrongly multiplied by the frequency of payment. We solve this problem by excluding outliers within groups with similar socioeconomic characteristics.

We corrected the top-coding problem by estimating the maximum income for the truncated surveys for each occupational category (employee, employer, and self-employed). Figure 2 shows the employers' income (in logs) for the surveys of September 1983 (top, truncated) and September 1982 (bottom, untruncated). In the top curve, the incomes of X individuals were truncated.

Figure 2



In order to estimate the maximum income for this group, we calculated the average annual growth rate in the incomes of a group of high-income individuals of identical size as X, but whose incomes had not been truncated. We applied this growth rate to the maximum income reported in the untruncated survey. This gives point P in the Figure.

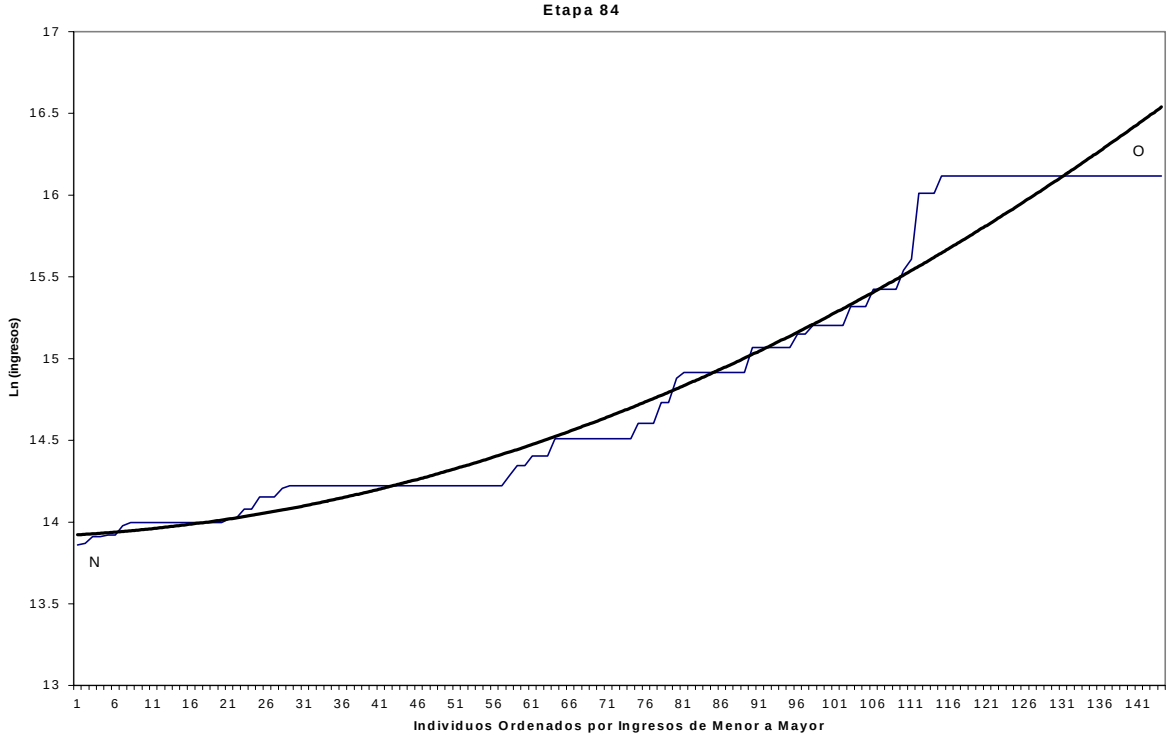
Once that maximum income (P) was calculated we fitted an exponential function between points O and P. The estimated income of the X (truncated) individuals are given by:

$$Y_i = e^{\alpha\, n_i - \beta} + vc + \chi\, n_i \qquad (1)$$

where $\beta = \alpha\, n - \ln(vm - vc - \chi\, n)$, α and χ are parameters of the exponential function, vc is the truncation value (Col$999,998 between stages 37 and 80, and Col$9'999,998 between stages 81 and 90), vm is the maximum (estimated) income in the truncated survey, and n is the number of individuals with truncated incomes. In order to obtain the parameters of the exponential function we estimated equation 1, with vc equal to income at point N, vm is income at point O (truncation value), and let α iterate between 0 and 4 and χ between 0 and 200,000. We chose the parameters that minimized the errors of the fit *vis à vis* the original data.

A third problem present in the NHS is what we called the surveyors' habit to top-code. In september 1993 an additional cell was included to increase the maximum income level from $999.998 to $9.999.998. Yet, some surveyors were not correctly informed about the change and continued to truncate people reporting an income over 1 million. This way, a considerable number of people with an income between one and ten million were registered as receiving 10 million. This problem showed between stages 81 and 86. To correct this problem we used equation (1) to calculate an exponential function between point O and N (see Figure 3) in order to minimize the error between the original data and the calculated function.

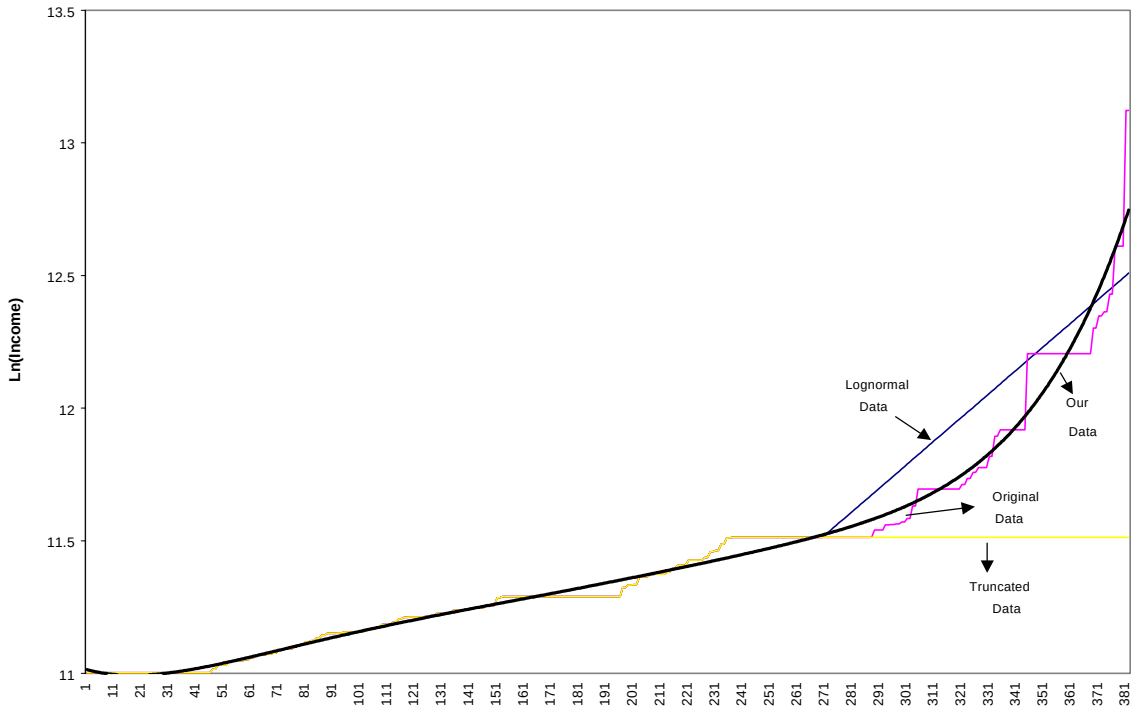
Figure 3



2. Other Procedures to Correct the National Household Surveys

The most conventional way of solving top-coding problems is to suppose a lognormal distribution for income reported in the NHS. Yet, statistical tests on the data do not accept the hypothesis that they have a lognormal distribution. We obtain an additional proof by comparing our results with those obtained with a lognormal distribution. For that purpose we artificially truncate an untrucated survey (see Figure 4). The lognormal distribution overestimates the average income by 9.5% and the Gini coefficient by 2.44%. Our methodology overestimated income by 0.9% and the Gini coefficient by 0.07% only.

Figure 4



Besides supposing a lognormal distribution of income other correcting procedures for top-coding problems have been designed. Urrutia (1994) and Sarmiento (1995) used a methodology based on the Pareto Law. According to this procedure:

$$N(y) = \beta\, y^{-\alpha} \qquad (2)$$

where N is the number of households with an income higher than y, α and β are parameters. A higher α supposes a better income distribution. For this reason, the results of an analysis based on this procedure always depend on the value of α. For example, while Urrutia (1994) uses α between 4 and 5, Sarmiento (1995) shows that this value should be between 1.5 and 1.8. This way, the studies arrive to different conclusions about the recent evolution of income distribution in Colombia.

Cárdenas and Gutiérrez (1996) eliminate the bottom and top 2% of the income distribution in order to exclude the truncated population. Yet, the higher the percentage of truncated population, the more undervalued is the Gini coefficient estimated with this procedure as Núñez and Jiménez (1997) pointed out.

Pérez et al. (1996) used a procedure in which they estimated the maximum income for truncated surveys between stages 45 and 81 based on inflation, growth in real wages and in GDP. They use a non-truncated stage (number 45) and use inflation to calculate the maximum income. The most visible problem of this procedure is that the maximum income calculated for september 1994 is approximately $37 million while in march 1996 (first stage without top-coding problems), the maximum income is $15 million.

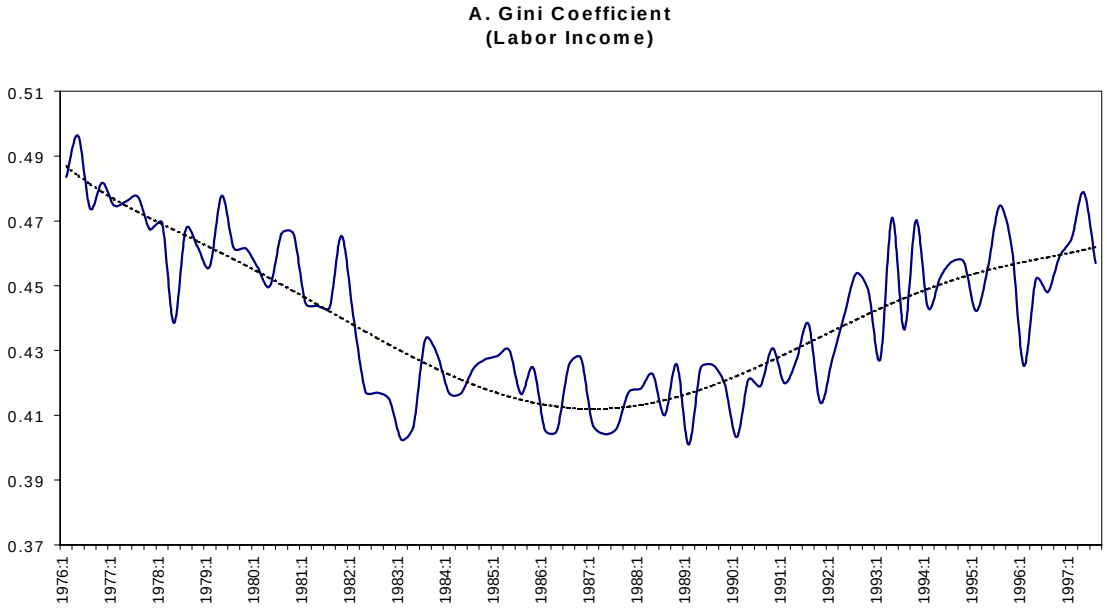
In conclusion, the methodology used in this paper is relatively *ad hoc* but has better statistical properties than alternative methodologies and overcomes some of the limitations of the procedures explained above.

III. RECENT EVOLUTION OF INCOME DISTRIBUTION IN COLOMBIA

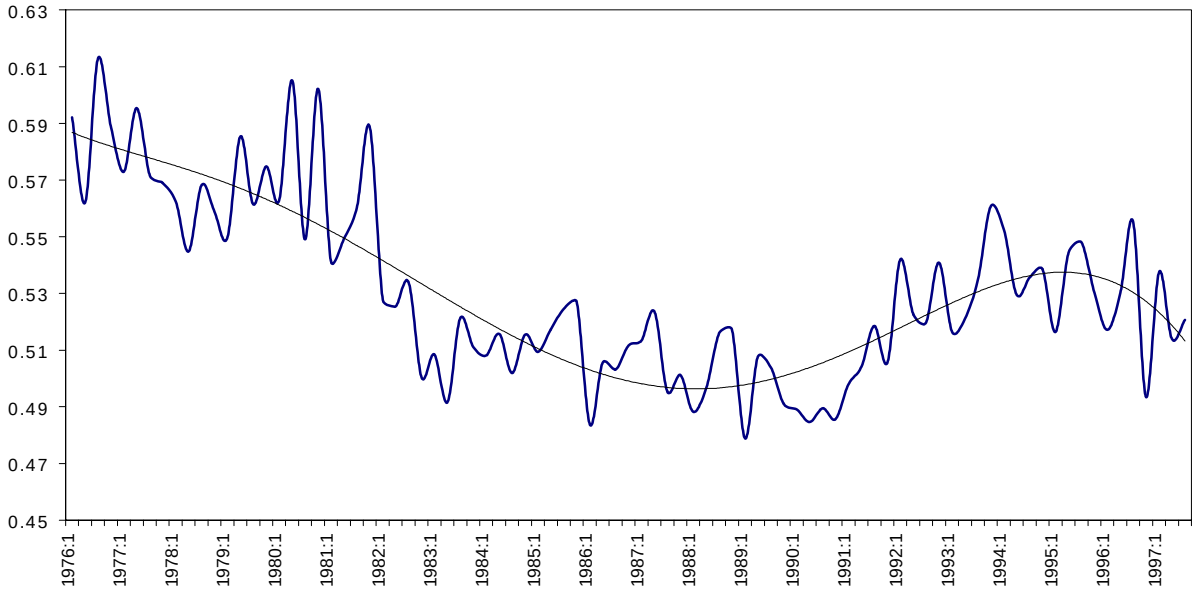
Throughout the paper we use three definitions of income. All our income concepts are based on primary sources. Thus, we ignore the role of transfers and subsidies to households[4]. First, we use pre-tax labor earnings for the individual. Second, we use pre-tax non-labor income (pensions, interest payments, dividends, and rents) where the receiver is also the individual. Third, we computed the gross monthly household income (from all sources). In every case, we used information for the seven main cities only.

Figure 5 shows the urban income distribution[5] as estimated by the maximum-income procedure. Clearly, labor income concentration (panel A) decreased between 1976 and 1982 when it was at its lowest point. After a relatively stable period between 1982 and 1990, in 1991 labor income concentration started to increase systematically during this decade. Panel B shows the Gini coefficient for non-labor income. As it is expected, concentration is higher for this type of income. Again, a decrease in the concentration of non-labor income took place between 1976 and 1982. Between 1982 and 1990 the Gini coefficient was relatively stable at a level of 0.50. Non-labor income concentration increased considerably between 1991 and 1996 as the Gini coefficient raised from 0.48 in the last quarter of 1990 to 0.55 in the third quarter of 1996. Yet, it has showed a slight decline since then.

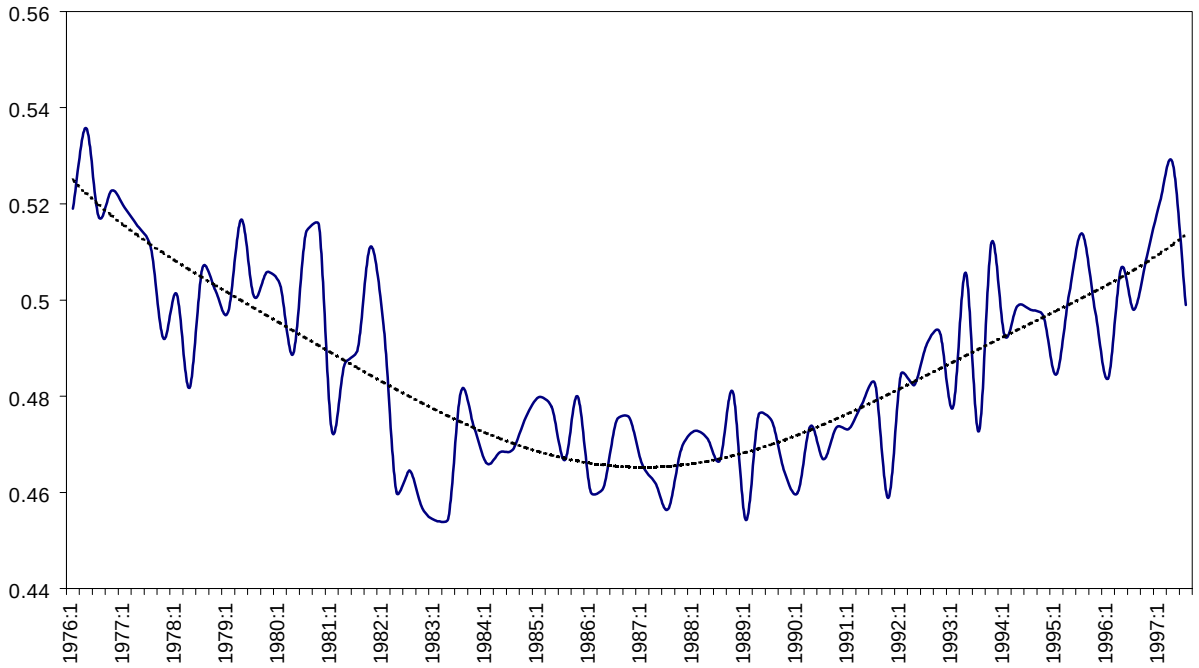
Figure 5



B. Gini Coefficient
(Non-labor income)



C. Gini Coefficient
(Total Household Income Per Capita)



Finally, for the case of total household income per-capita the Gini coefficient shows pretty much the same trends: decreasing income concentration between 1976 and 1982, a stable period until 1990 and a considerable concentration in distribution since then. As it can be seen, the Gini coefficient increased from 0.46 in 1990 to 0.52 during the first quarter of 1997.

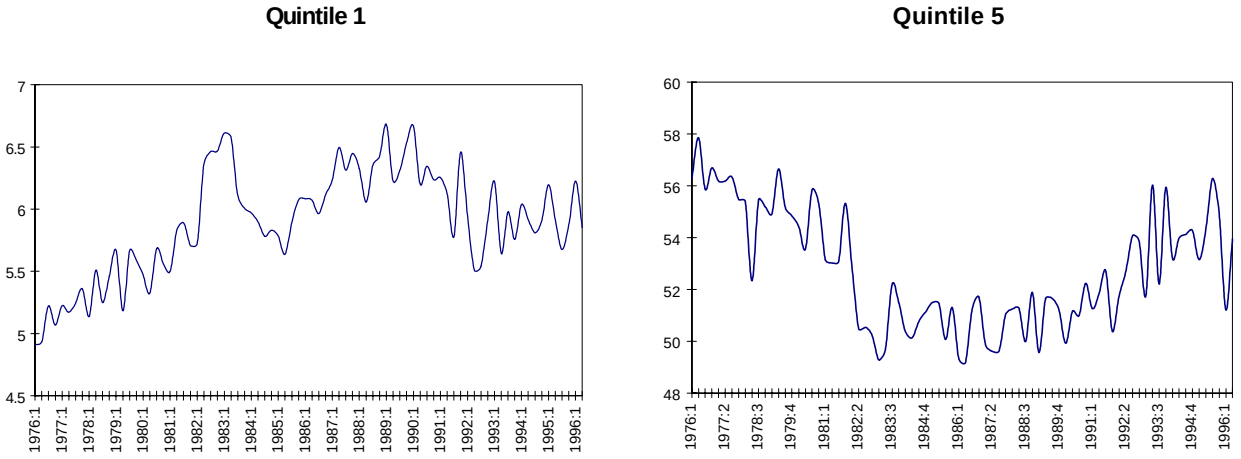
Figure 6 shows share of labor income by quintile for each type of income. These data confirm the mentioned trends: Until the early 1980s all the measures point towards a reduction in income concentration. This trend reversed during the late 1980s. According to the 1996 data, the top quintile received 54% of total labor income, while the bottom quintile received 6% (see Panel A). These facts indicate that the share of the top quintile is 9 times larger than that of the bottom quintile. In fact, the top quintile's share has increased steadily during the 1990s.

Panel B shows the same variables calculated with non-labor income only. Clearly, in this case concentration of income is much higher. In 1996, only 2.7% of non-labor income was received by the bottom decile, while 60% went to the top 20% of the population.

Lastly, Panel C of Figure 6 depicts income shares based on the total household income in per capita terms[6]. Since the average size of low-income households is relatively larger, income distribution is more skewed according to these measures. The top to bottom quintile ratio was 14 in 1996 (10 in 1982), a figure that is likely one of the highest in the developing world. More worrisome is the trend observed since 1991. The top quintile's share rose from 54.7% in 1991 to 57.8% in 1996.

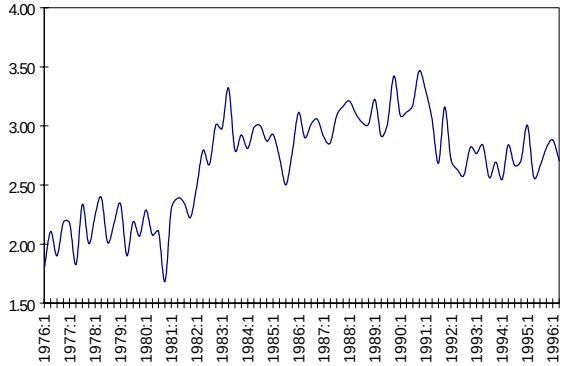
Figure 6
SHARES BY QUINTILE

A. LABOR INCOME

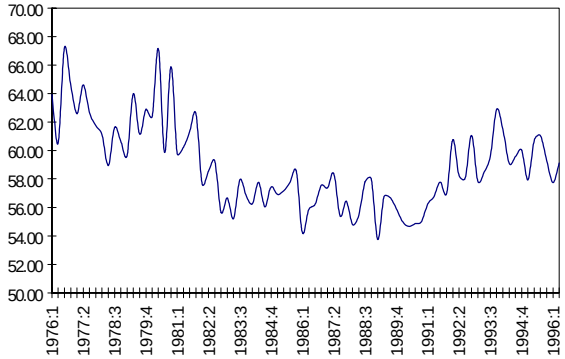


B. NON-LABOR INCOME

Quintile 1

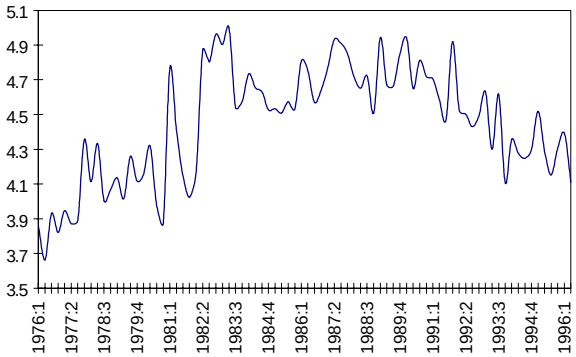


Quintile 5

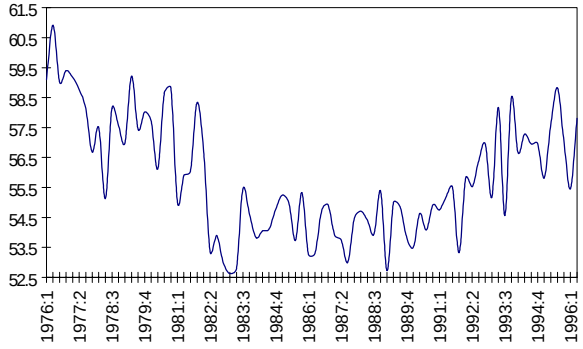


C. TOTAL HOUSEHOLD INCOME PER CAPITA

Quintile 1



Quintile 5



Several studies have aimed to explain the recent deterioration in urban income distribution in Colombia. In particular, Núñez and Sánchez (1996) show that until the end of the eighties a reduction in the relative wages of skilled workers due to a decrease in their relative demand had induced an improvement in income distribution. Yet, since then the process reversed as the relative demand for skilled employment increased with the consistent increase in relative wages. This way, labor income concentration increased substantially.

Cárdenas and Vélez (1996) argue that wage dispersion between skilled and unskilled workers resulted from a considerable reduction in capital prices, which allowed significant increases in skill complementary investment. Nevertheless, the authors argue that income

distribution deterioration was offset by the increased social government expenditure based on demand subsidies aimed to the poorer. The study shows that government expenditure in education, health and child care offset the negative trend of income distribution caused by transformations of the labor market. According to some calculations, resource reallocation through government expenditure represented a change in the Gini coefficient from 0.50 to 0.47 in 1994, what means a decrease of approximately 7% in income concentration.

In a similar line of work, Cárdenas and Bernal (1998) show that the decrease in the skill premium between 1976 and 1981 is related to the reduction in the relative demand for skilled workers, and the post-1991 increase in relative wages can be attributed to the rapid increase in their relative demand. Emphasis is made in the importance of skill complementary technological changes as a key factor behind recent shifts in relative demand.

Robbins (1998) shows that the change in the demand for skilled workers was related to the strong devaluation of the mid-eighties. After that, it was primarily associated with trade liberalization through the impact of reducing protection tariffs and was partially offset by the revaluation that took place during this period.

Spilimbergo et al. (1997) use panel data from household surveys to show that countries relatively well endowed with land and capital have a more unequal income distribution while skill intensive countries have lower inequality. Additionally they conclude that trade openness reduces inequality in capital-abundant countries but increases it in skill-abundant ones.

Bernal et al. (1996) state a strong relationship between macroeconomic performance and urban income distribution in Colombia. Their results indicate that unemployment and inflation have significant regressive effects. Manufacturing output growth is clearly progressive, as well as improved conditions in the rural areas. Currency overvaluation is also related to income concentration. For these reasons, they argue that the recent combination of high unemployment, an overvalued currency, and low overall economic growth have resulted in greater inequality.

In a recent paper, Ocampo et al. (1998) conclude that the recent deterioration in income distribution resulted from three sources: (1) a strong bias in favor of skilled workers related to the trade liberalization, the increase in investment rates and the increase in government consumption expenditure; (2) an overall reduction in labor demand due to the liberalization process, high investment rates and increases in non-labor costs; and (3) a considerable increase in non-labor urban income possibly associated with the expansion of aggregate demand during these years.

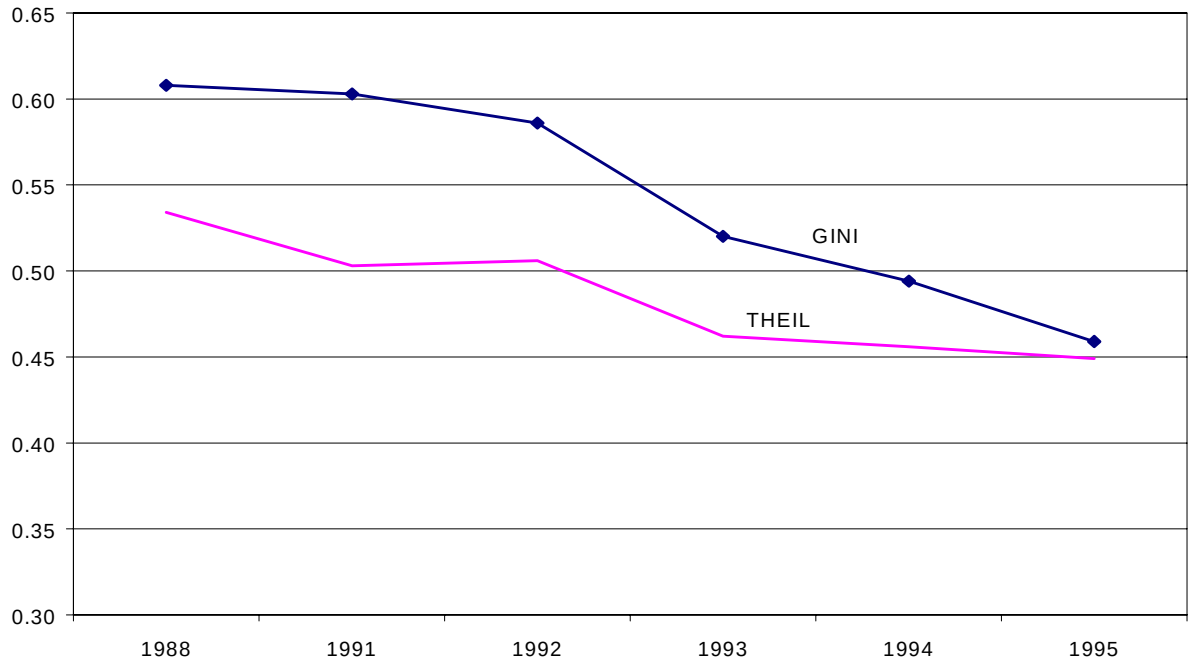
At this point, it is important to describe briefly the evolution of income distribution in the rural areas. A couple of studies have recently showed information about rural labor and total income distribution[7]. Panel A of Figure 7 depicts the evolution of the Gini coefficient and the Theil index based on total per-capita household income in rural areas as calculated by Leibovich (1998). In this case the data from the Household Surveys was adjusted to population and non-monetary earnings. Estimating a human capital model with bias selection correction using a

Heckman filter included non-informers of income. Finally, top-coding problems were also corrected. Two main results can be derived from this information. The first is that income concentration in rural areas is significantly high with an average Gini coefficient of 0.56 from 1988 to 1995. Second, rural income distribution has improved significantly during the last years as the Gini coefficient decreased from 0.60 in 1988 to 0.46 in 1995. Leibovich (1998) relates this improvement to both the changes in social-demographic variables as education, age and the size of households, and the change of the labor market conditions in rural areas.

Panel B of Figure 7 shows the evolution of the Gini coefficient for urban and rural areas as well as a national measure of income distribution as calculated by Ocampo et al. (1998). This data was also corrected for top-coding problems in the Household Surveys. This information indicates that while urban income distribution deteriorated considerably from 1988 to 1995 as the Gini coefficient increased from 0.48 in 1991 to 0.53 in 1995, rural income distribution improved during the same period[8] as the Gini coefficient decreased from 0.56 in 1991 to 0.44 in 1995. In sum, the national income distribution remained practically unchanged during this period with an average Gini coefficient of 0.53.

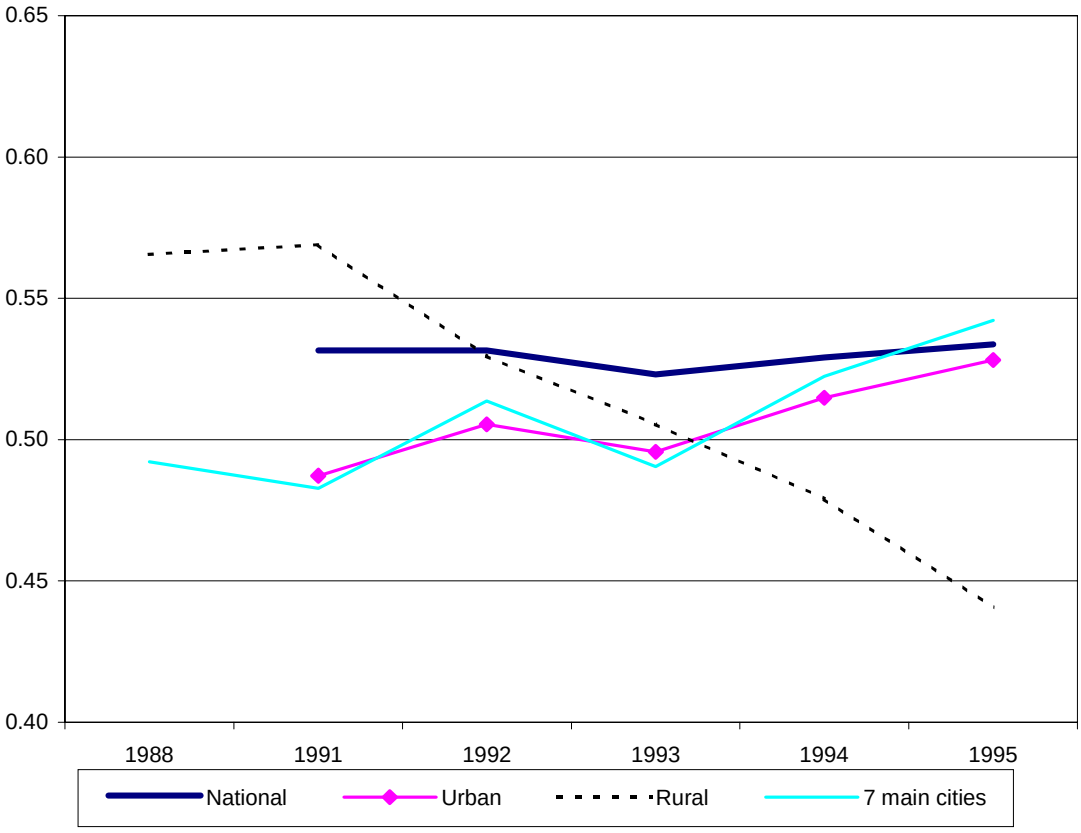
Figure 7

A. Per-Capita Income Distribution in Rural Areas



Source: Leibovich (1998). Household Surveys.

B. Per-Capita Household Income Distribution
GINI COEFFICIENT



Source: Ocampo et al. (1998). Household Survey.

In the following sections of this study we intend to explain the recent increase of urban income concentration in Colombia. In particular, we are interested in understanding the relation between the structural reforms and the evolution of income distribution in the main cities during the 90s.

IV. DISTRIBUTION DECOMPOSITION ANALYSIS

In order to describe the data we performed some static decompositions of inequality in Colombia. The goal is to separate total inequality into a component of inequality between some arbitrarily chosen groups, and the remaining within-group inequality. The individuals were grouped according to age, gender, educational attainment, geographical location, occupation and sector. In the case of household income these partitions can be made according to the characteristics of the household head.

In order to perform these decompositions we used the Theil index, which is a particular case of the generalized entropy class of measures. In this case we adjusted the data by including the average income obtained by the estimation of a human capital model to non-informers[9]. The partition of the overall distribution by individual attribute was carried for level of education. In particular, we calculated:

$$H_T = \sum_{k=1}^{k} q_k \sum_{j=1}^{j} \frac{q_{j,k}}{q_k} \ln \frac{q_{j,k}/q_k}{p_{j,k}/p_k} + \sum_{k=1}^{k} q_k \ln \frac{q_k}{p_k} \qquad \textbf{(1)}$$

where q_k is group's k share in total income (groups were defined according to the cited characteristics), $q_{j,k}$ is the share of individual j in group k, p_k is the share of group k in total population and $p_{j,k}$ is the share of individual j in group k. The first term on the right hand side is the Theil index within groups (T_W) and the second term is the Theil index between groups (T_B). The ratio $R_B = \frac{T_B}{T_T}$ measures the share of inequality that can be explained with the attribute that defines the groups' partition[10].

Table 1 shows the Theil index decomposition when groups are defined according to the educational attainment of individuals. Dispersion is explained both by differences between groups and differences within each of the groups, as both Theil indexes between and within-groups are significantly high. The measure R_B at the bottom of the table shows that educational differences have explained on average 29% of labor income and total household income inequality while have accounted on average for 18% of non-labor income dispersion. Additionally one can observe that the explicative power of education has increased over time. While in 1988, 27% of labor income inequality could be explained by differences in education, in 1996 this percentage increased to 36%. Interestingly enough, when adding up the within and between inequality of the 16 or more years of education group we obtain 70% of labor income

total Theil index in 1988 and 92% in 1996. This means that high dispersion among individuals with 16 years or more of education and sharp differences between wages of this group and the other groups by educational attainment explain most of income inequality due to educational gaps. In the case of non-labor income, differences within and between this same group account for 42% of total Theil index in 1988 and 80% in 1996. Finally, for total household income per capita this measure represented 63% of total Theil index in 1988 and increased to 84% in 1996.

Table 1
EDUCATION

	Labor Income			Non-labor income			Total household income per capita		
	1988	1993	1996	1988	1993	1996	1988	1993	1996
THEIL	**0.432**	**0.522**	**0.457**	**0.599**	**0.678**	**1.025**	**0.582**	**0.596**	**0.625**
Within-groups theil	0.317	0.399	0.291	0.498	0.572	0.811	0.418	0.429	0.416
0 years	0.027	0.004	0.001	0.007	0.010	0.007	0.042	0.005	0.003
1-4 years	0.020	0.030	0.017	0.029	0.071	0.027	0.025	0.029	0.020
5 years	0.032	0.042	0.027	0.066	0.081	0.065	0.046	0.054	0.039
6-10 years	0.061	0.077	0.043	0.132	0.115	0.117	0.082	0.083	0.071
11 years	0.062	0.084	0.071	0.113	0.094	0.094	0.082	0.082	0.068
12-15 years	0.038	0.043	0.030	0.050	0.067	0.048	0.035	0.040	0.040
16 years or more	0.076	0.118	0.102	0.103	0.134	0.453	0.107	0.135	0.175
Between-groups theil	0.115	0.123	0.167	0.101	0.106	0.214	0.164	0.167	0.209
0 years	-0.006	-0.009	-0.007	-0.018	-0.019	-0.020	-0.009	-0.011	-0.010
1-4 years	-0.045	-0.033	-0.032	-0.057	-0.046	-0.052	-0.062	-0.047	-0.047
5 years	-0.047	-0.048	-0.050	-0.053	-0.042	-0.060	-0.067	-0.064	-0.067
6-10 years	-0.052	-0.057	-0.069	-0.013	-0.047	-0.050	-0.048	-0.061	-0.069
11 years	0.003	-0.009	-0.020	0.059	0.033	0.012	0.037	0.013	0.003
12-15 years	0.036	0.023	0.022	0.030	0.028	0.015	0.048	0.036	0.044
16 years or more	0.227	0.255	0.323	0.153	0.199	0.369	0.264	0.300	0.355
Between-groups / Theil	26.7%	23.5%	36.5%	16.9%	15.7%	20.9%	28.1%	28.0%	33.5%

Table 2 shows the decomposition results when groups are formed according to the age of individuals or the household head. As for the high within-groups Theil and considerably small between-groups Theil one can infer that most of inequality is explained by differences in age between groups while there does not seem to be a great difference within individuals of the same group. Additionally the R_B measure indicates that on average 7.9% of labor income inequality can be explained by differences in age among groups. These differences account only for 5.2% of non-labor income dispersion, and only for 1.4% of total household income per capita inequality. The group of individuals between 41 and 50 years of age shows the greatest dispersion within individuals and the highest dispersion of labor and non-labor income with respect to the rest of the groups. This indicates that wages of individuals in this group are higher than those of younger or older individuals, which is consistent with the fact that this stage corresponds to the changing point of the life cycle. Nevertheless, adding up within and between dispersion of the 41 to 50 years old group we obtain only a 34% on average of the total Theil index meaning that differences within and between other age groups are also important in explaining labor and non-labor income inequality.

Table 2
AGE

	Labor income			Non-labor income			Total household income per capita		
	1988	1993	1996	1988	1993	1996	1988	1993	1996
THEIL	**0.432**	**0.522**	**0.457**	**0.599**	**0.678**	**1.025**	**0.582**	**0.596**	**0.625**
Within-groups theil	0.394	0.487	0.420	0.582	0.636	0.956	0.574	0.589	0.616
12-17 years	0.002	0.004	0.002	0.005	0.009	0.006	0.000	0.000	0.000
18-25	0.033	0.041	0.025	0.052	0.022	0.072	0.025	0.023	0.015
26-30	0.048	0.061	0.050	0.047	0.048	0.450	0.073	0.070	0.146
31-35	0.062	0.078	0.074	0.066	0.058	0.024	0.076	0.088	0.069
36-40	0.064	0.104	0.071	0.067	0.081	0.034	0.095	0.114	0.077
41-50	0.102	0.118	0.103	0.104	0.133	0.105	0.117	0.134	0.132
51-60	0.047	0.053	0.069	0.088	0.117	0.091	0.090	0.084	0.099
> 60	0.035	0.027	0.026	0.153	0.167	0.174	0.098	0.077	0.078
Between-groups theil	0.038	0.035	0.037	0.017	0.041	0.068	0.008	0.007	0.010
12-17 years	-0.012	-0.013	-0.010	-0.010	-0.019	-0.017	0.000	0.000	0.000
18-25	-0.071	-0.059	-0.061	-0.032	-0.034	-0.030	-0.013	-0.015	-0.019
26-30	-0.015	-0.018	-0.020	-0.005	-0.002	0.101	-0.016	-0.014	-0.003
31-35	0.020	0.010	0.019	0.003	-0.001	-0.014	-0.009	-0.014	-0.012
36-40	0.029	0.039	0.024	0.010	0.015	-0.011	-0.006	0.003	-0.012
41-50	0.057	0.055	0.049	0.024	0.035	0.017	-0.003	0.004	0.004
51-60	0.019	0.017	0.033	0.006	0.035	0.018	0.014	0.018	0.033
> 60	0.011	0.004	0.003	0.021	0.013	0.005	0.040	0.024	0.019
Between-groups / Theil	8.9%	6.7%	8.1%	2.9%	6.1%	6.7%	1.4%	1.1%	1.5%

Similarly, Table 3 presents the results of the exercise when dividing population according to the region. In this case, we have information for the 7 main cities of Colombia: Barranquilla, Bucaramanga, Bogotá, Manizales, Medellín, Cali and Pasto. The results clearly show that there is not a strong difference between cities (the between-groups Theil index is only 0.009) while most of income dispersion is explained by sharp differences within each of the cities, being Bogotá the one with higher concentration. Differences determined by city account for only a 2% of labor income inequality in 1996, 2.5% of non-labor income dispersion and 2.1% of total household income inequality.

Table 4 shows the results of decomposition by gender. Clearly, almost all inequality due to differences in gender is explained by sharp dispersion within the male group. That means that income is distributed more homogeneously among women. In fact the within and between-group dispersion of the male group accounts for the 95% of total Theil index. Additionally, differences by gender explain 4.2% of labor income inequality in 1988 but this percentage decreased to 3.5% in 1996. On the other hand, differences by gender explained 4.5% of non-labor income inequality in 1996 while differences by gender did not explain total household income dispersion.

Table 3
REGION

	Labor income			Non-labor income			Total household income per capita		
	1988	1993	1996	1988	1993	1996	1988	1993	1996
THEIL	**0.432**	**0.522**	**0.457**	**0.599**	**0.678**	**1.025**	**0.582**	**0.596**	**0.625**
Within-groups theil	0.429	0.516	0.448	0.590	0.670	0.999	0.570	0.585	0.612
Barranquilla	0.038	0.044	0.034	0.020	0.075	0.040	0.033	0.044	0.033
Bucaramanga	0.024	0.028	0.025	0.025	0.022	0.034	0.024	0.021	0.027
Bogotá	0.208	0.235	0.264	0.335	0.247	0.268	0.309	0.286	0.287
Manizales	0.008	0.014	0.008	0.019	0.044	0.029	0.013	0.018	0.013
Medellín	0.087	0.098	0.064	0.077	0.156	0.584	0.096	0.100	0.194
Cali	0.056	0.093	0.046	0.093	0.116	0.035	0.086	0.112	0.051
Pasto	0.007	0.005	0.008	0.021	0.010	0.009	0.008	0.005	0.009
Between-groups theil	0.004	0.006	0.009	0.009	0.008	0.026	0.012	0.010	0.013
Barranquilla	-0.009	-0.016	-0.008	-0.014	-0.008	-0.016	-0.023	-0.023	-0.019
Bucaramanga	-0.004	-0.008	-0.009	-0.014	-0.015	-0.019	-0.006	-0.009	-0.007
Bogotá	0.033	0.029	0.070	0.058	0.004	0.009	0.069	0.033	0.077
Manizales	-0.005	-0.002	-0.005	-0.008	0.002	-0.005	-0.006	-0.001	-0.005
Medellín	0.000	-0.006	-0.019	-0.009	0.023	0.092	-0.013	-0.008	-0.003
Cali	-0.007	0.014	-0.016	-0.002	0.011	-0.028	-0.003	0.026	-0.025
Pasto	-0.005	-0.006	-0.005	-0.001	-0.010	-0.008	-0.006	-0.006	-0.005
Between-groups / Theil	0.8%	1.1%	2.0%	1.6%	1.2%	2.5%	2.1%	1.8%	2.1%

Table 4
GENDER

	Labor income			Non-labor income			Total household income per capita		
	1988	1993	1996	1988	1993	1996	1988	1993	1996
THEIL	**0.432**	**0.522**	**0.457**	**0.599**	**0.678**	**1.025**	**0.582**	**0.596**	**0.625**
Within-groups theil	0.414	0.505	0.441	0.592	0.666	0.979	0.580	0.595	0.625
Male	0.316	0.357	0.318	0.315	0.355	0.761	0.434	0.483	0.507
Female	0.098	0.148	0.123	0.277	0.311	0.218	0.146	0.113	0.118
Between-groups theil	0.018	0.016	0.016	0.007	0.012	0.046	0.002	0.000	0.000
Male	0.098	0.094	0.093	0.064	0.084	0.174	-0.026	-0.002	0.005
Female	-0.080	-0.078	-0.077	-0.057	-0.072	-0.128	0.028	0.002	-0.005
Between-groups / Theil	4.2%	3.1%	3.5%	1.2%	1.8%	4.5%	0.3%	0.0%	0.0%

The decomposition of the Theil index by occupation is shown in Table 5. The results indicate that most of the dispersion by occupation is explained by differences within-groups (the within-groups Theil is 0.38 while the between-groups Theil is only 0.07) rather than by differences between them. In particular, non-production and self-employed workers show the highest within dispersion indicating sharp differences between members of these groups. On the other hand, the employers group shows higher inequality with respect to the other groups indicating they receive the highest wages. The group of non-production workers is relatively well differentiated from the other groups as well, given it shows a considerably high between-groups Theil index. Overall, differences in occupation have accounted on average for 15% of labor income inequality during this period.

Table 5
OCCUPATION

	Labor income		
	1988	1993	1996
THEIL	**0.432**	**0.522**	**0.457**
Within-groups theil	0.364	0.447	0.388
Production employment	0.026	0.044	0.024
Non-production employment	0.138	0.178	0.181
Domestic employment	0.003	0.004	0.002
Self-employed	0.137	0.143	0.134
Employers	0.059	0.077	0.047
Between-groups theil	0.069	0.074	0.070
Production employment	-0.061	-0.062	-0.066
Non-production employment	0.040	0.027	0.046
Domestic employment	-0.023	-0.018	-0.015
Self-employed	-0.013	-0.003	-0.014
Employers	0.126	0.131	0.119
Between-groups / Theil	15.9%	14.3%	15.3%

Finally, Table 6 shows the Theil decomposition by sector. Again, almost all income distribution differences by sector can be explained by within-group dispersions rather than by high differences between economic activities. In this case the retail sector exhibits the higher within-group dispersion probably due to the high heterogeneity of employment that characterizes this activity. On the other hand, the financial services sector is well differentiated from the other sectors as shown by the high between-groups Theil index. This fact indicates that workers in this activity receive higher wages. Sectorial differences accounted for 3% of labor income inequality in 1988 and this percentage increased to 5% in 1996.

Table 6
SECTOR

	Labor income		
	1988	1993	1996
THEIL	**0.432**	**0.522**	**0.457**
Within-groups theil	0.419	0.505	0.437
Agriculture	0.013	0.011	0.013
Mining	0.004	0.004	0.003
Manufacturing	0.076	0.082	0.071
Electricity, gas and water	0.002	0.003	0.002
Construction	0.029	0.042	0.021
Retail	0.120	0.119	0.108
Transportation and communications	0.019	0.035	0.036
Financial Services	0.049	0.068	0.066
Personal and government services	0.107	0.141	0.117
Non-informers	0.000	0.001	0.001
Between-groups theil	0.013	0.017	0.021
Agriculture	0.007	0.004	0.009
Mining	0.004	0.006	0.006
Manufacturing	-0.025	-0.031	-0.036
Electricity, gas and water	0.002	0.003	0.002
Construction	-0.003	-0.001	-0.008
Retail	-0.007	-0.018	-0.021
Transportation and communications	0.008	0.013	0.014
Financial Services	0.044	0.050	0.057
Personal and government services	-0.018	-0.009	-0.003
Non-informers	0.000	0.000	0.000
Between-groups / Theil	3.1%	3.3%	4.7%

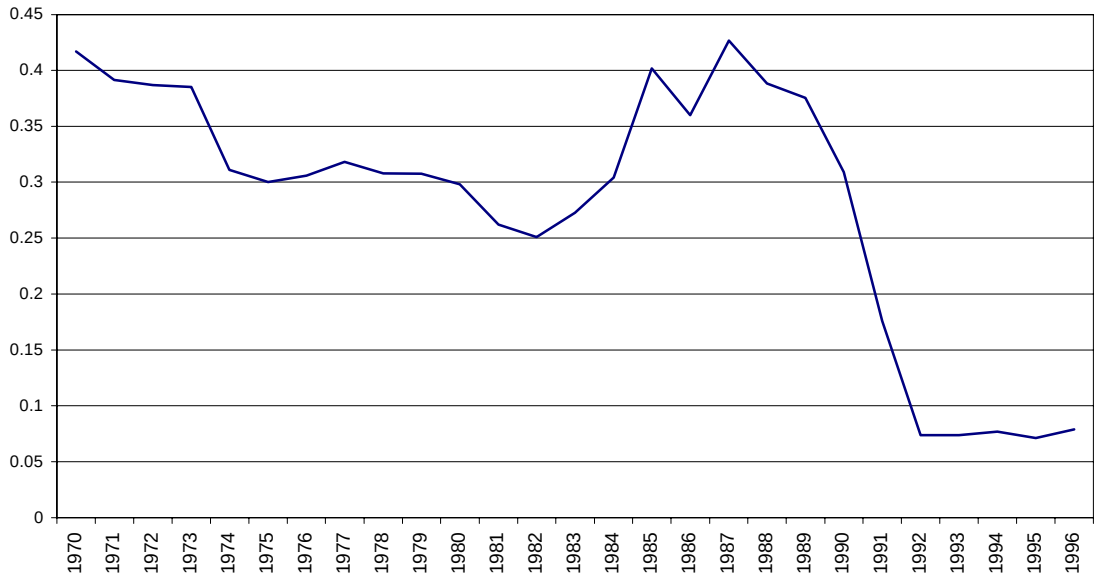
Overall, differences in education, age, region, gender, occupation and economic activity accounted for 60% of labor income dispersion in 1988 and 70% in 1996. This means that almost a 30% of income inequality has to be explained by other factors different from characteristics of the individuals at the microeconomic level. In this sense, Bernal et al. (1997) explore the relation between macroeconomic variables and income distribution, finding that inflation, unemployment, currency overvaluation and growth in the non-traded sectors raise income concentration.

V. CHANGES IN INCOME DISTRIBUTION AND STRUCTURAL REFORMS

The recent evolution of income distribution in Colombia has been linked to the effects of structural reform. Between 1990 and 1994 the country adopted a comprehensive package of structural reforms. Average tariffs and non-tariff restrictions were lowered to 7.5% in 1992 from 40% in 1988 (see Figure 7) and free-trade agreements were signed with the Andean Pact countries, Mexico and Chile. Consistently imports increased significantly from 15% of GDP in 1990 to 35% in 1996 (see Panel B in Figure 8). The 1991 constitutional reform granted independence to the central bank. Also, controls on foreign exchange transactions and foreign direct investment were eliminated, and a fully funded private pension system was introduced. Most publicly owned financial institutions and large public utilities have been privatized.

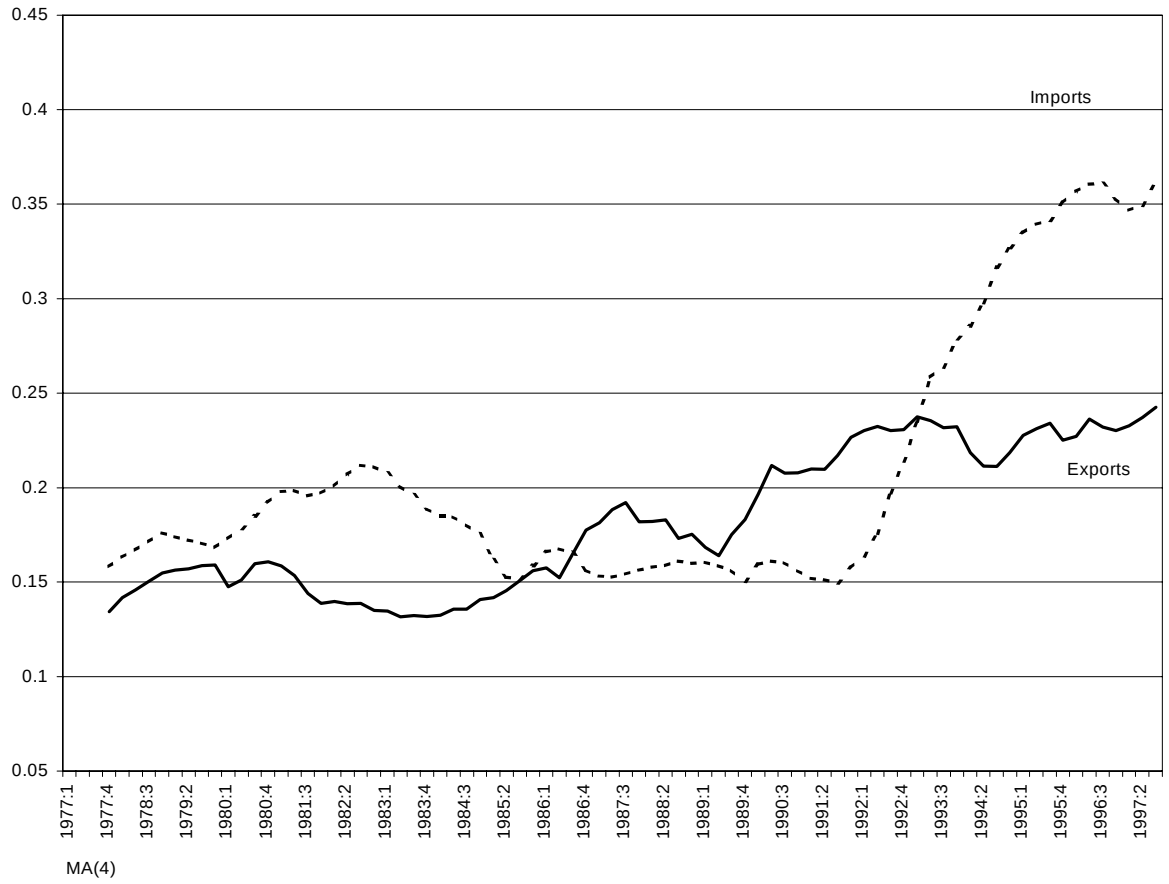
Figure 8

A. Average tariff and non-tariff restrictions



Source: Ocampo (1994).

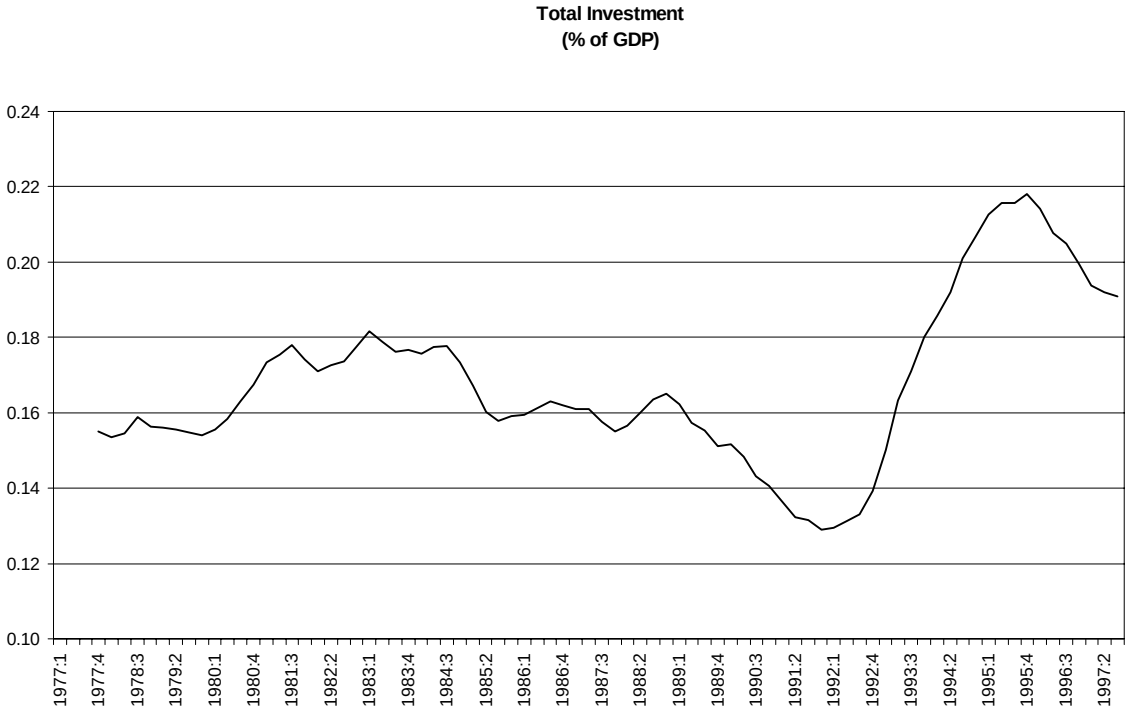
B. Total Exports and Imports
(% of GDP)

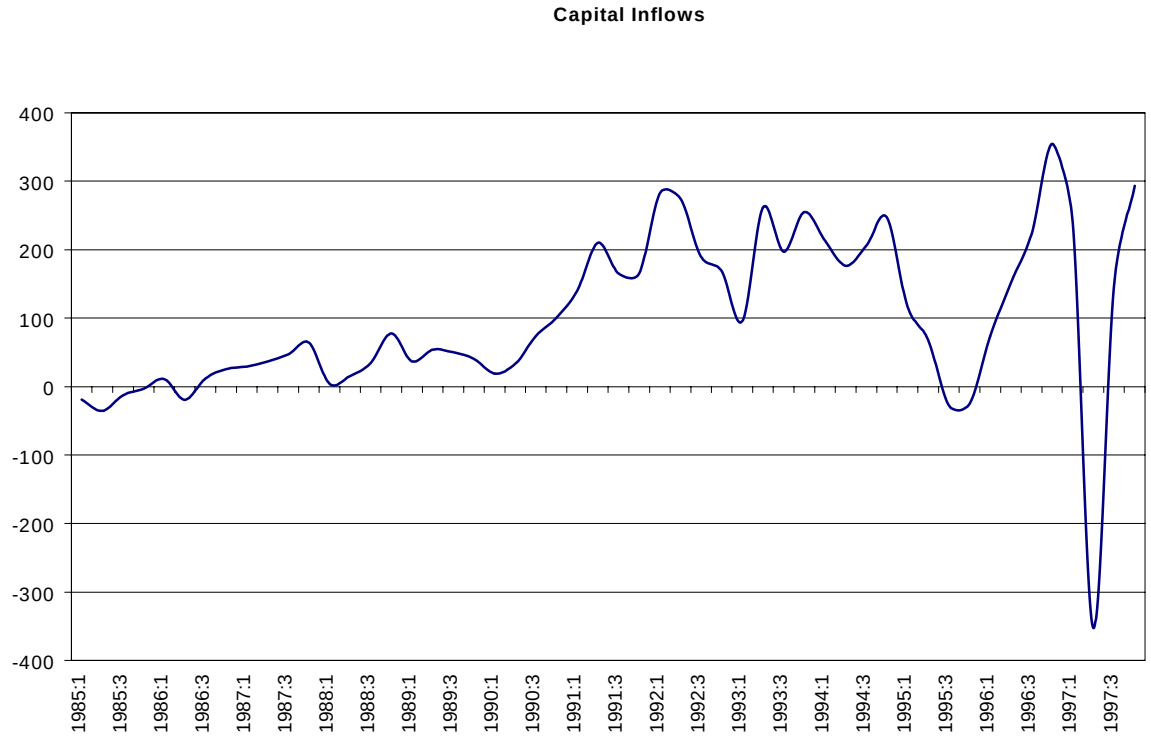


Source: National Planning Department.

As a result of the market-oriented reforms investment increased from 15% of GDP during the late 1980s to an average of 18% after reforms as can be seen in Figure 9, mostly due to larger long-term foreign capital inflows, which doubled to nearly 5% of GDP per year. Investment in infrastructure is now 5% of GDP, nearly three times more its pre-reform level. Moreover, annual imports of capital goods increased from an average of US$1.2 billion (in constant 1996 dollars) between 1985 and 1991, to US$5 billion after the reforms[11].

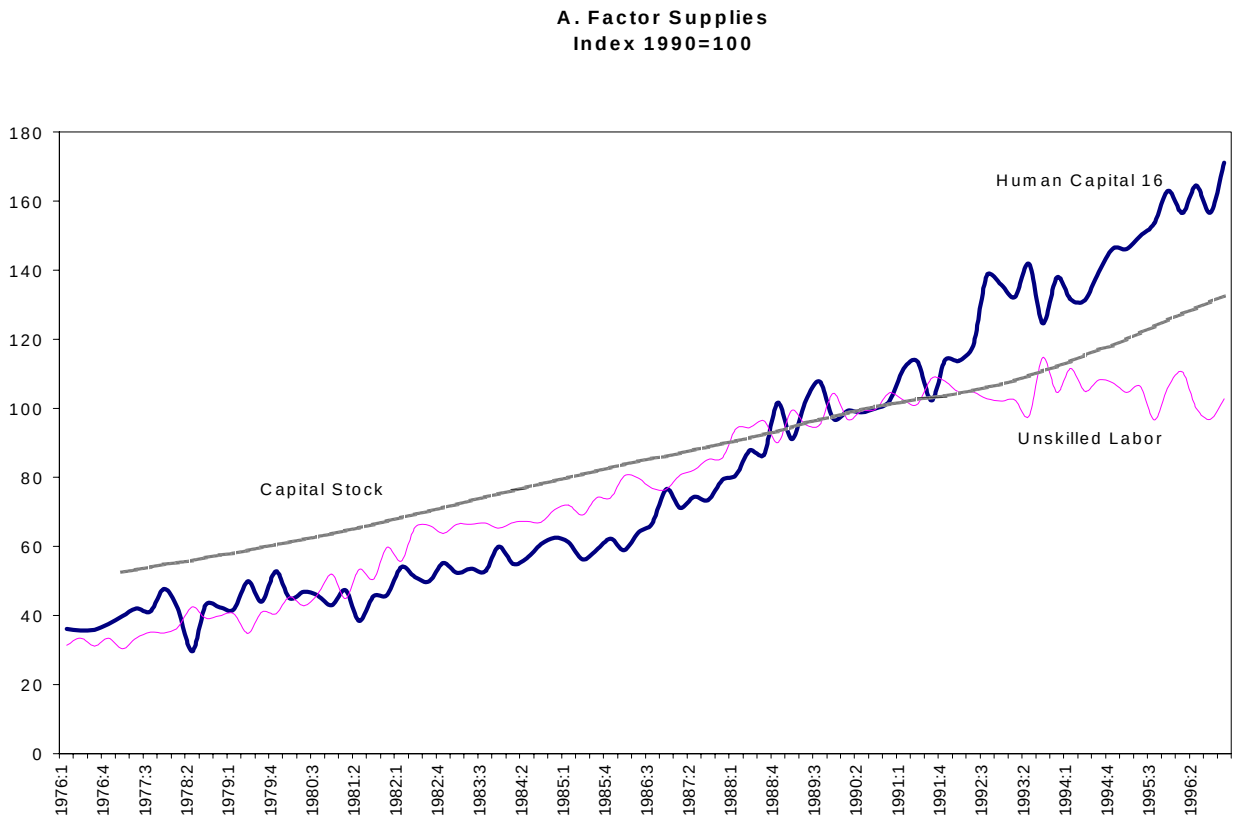
Figure 9


Total Investment
(% of GDP)
0.24
0.22
0.20
0.18
0.16
0.14
0.12
0.10
1977:1
1977:4
1978:3
1979:2
1980:1
1980:4
1981:3
1982:2
1983:1
1983:4
1984:3
1985:2
1986:1
1986:4
1987:3
1988:2
1989:1
1989:4
1990:3
1991:2
1992:1
1992:4
1993:3
1994:2
1995:1
1995:4
1996:3
1997:2


Capital Inflows
400
300
200
100
0
-100
-200
-300
-400
1985:1
1985:3
1986:1
1986:3
1987:1
1987:3
1988:1
1988:3
1989:1
1989:3
1990:1
1990:3
1991:1
1991:3
1992:1
1992:3
1993:1
1993:3
1994:1
1994:3
1995:1
1995:3
1996:1
1996:3
1997:1
1997:3

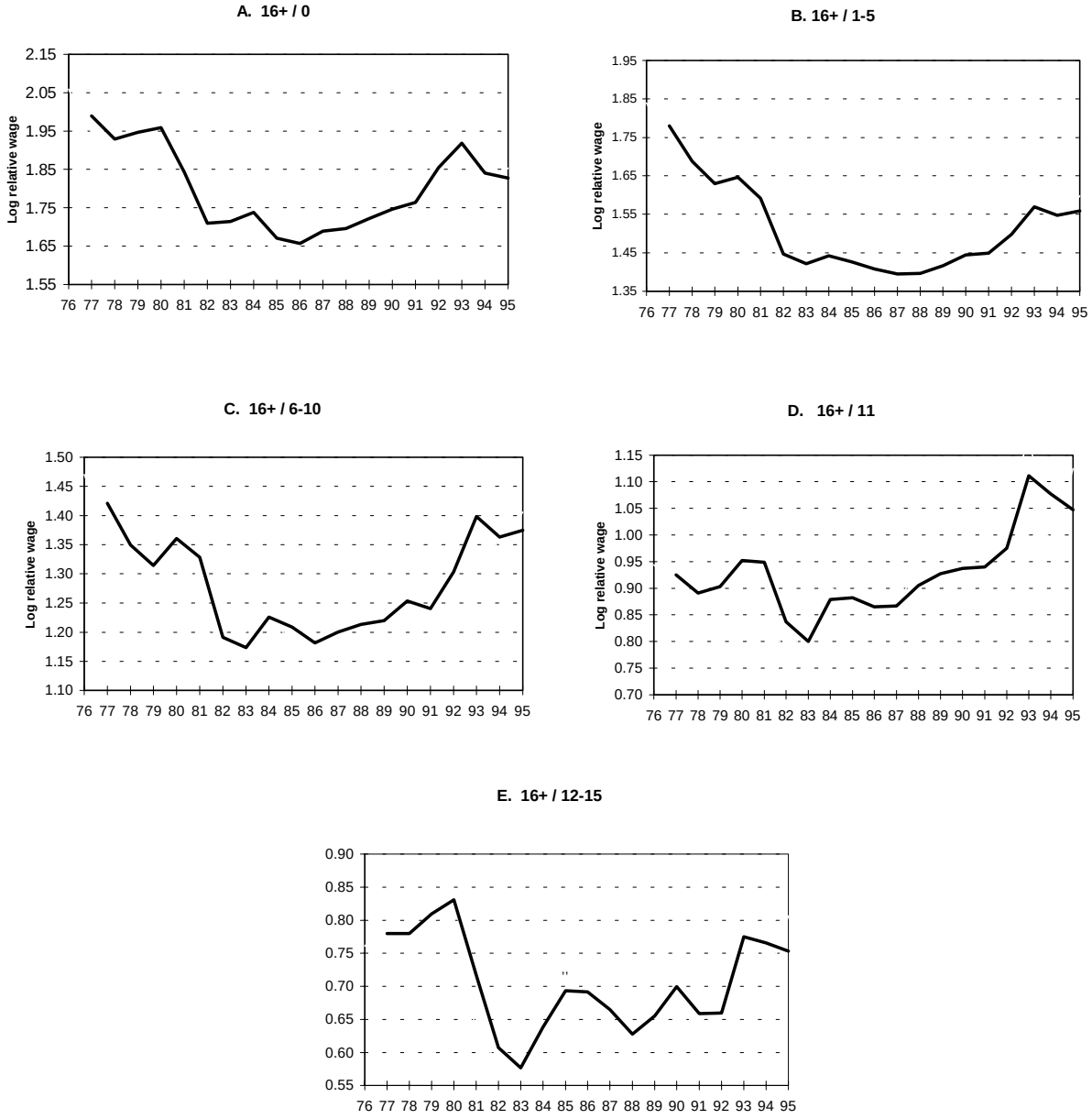
At the same time, human capital[12] supply has increased significantly since 1991 while unskilled labor has slightly decreased as shown in Panel A in Figure 10. Evidently, relative employment (skilled / unskilled) has increased during this period. Relative labor demand has shifted in favor of skilled workers causing an increase in overall wage differentials since 1991 (see Panel B in Figure 10). As can be seen in Figure 11, wages of college graduates (16 or more years of schooling) relative to high school graduates (11 years of schooling) increased by 21% between 1991 and 1995. A similar result is obtained when earnings of college graduates are compared with those of workers with partial secondary or tertiary education. This increase in wage inequality contrasts with the rapid decline in educational wage differentials observed during the 1970s and early 1980s.

Figure 10



We now present an exercise to analyze the relationship between structural adjustment and income inequality. We first use quarterly data since 1980[13] and then use annual data from 1977 to 1996 due to the fact that some variables are not available at the quarterly frequency. Table 7 presents the first regressions that link income distribution measured by the Gini coefficient and private investment as percentage of GDP, public expenditure as percentage of GDP, real exchange rate, capital inflows and exports as percentage of GDP. This same equation is estimated for both labor income inequality and total household income per capita inequality.

Figure 11
COLLEGE PREMIUM. LOG OF RELATIVE WAGES FOR WORKERS WITH 16 OR MORE YEARS OF SCHOOLING



Source: Sánchez and Núñez (1998) based on the National Household Survey.

The results indicate that private investment as percentage of GDP is related to increases in income inequality. In fact, an increase of one-percentage point in the private investment to GDP ratio increases the Gini coefficient (measured by total household income per capita) by 0.21 percentage points. This result is related to the effects of skill complementary investment on wage differentials, as we will show in the next section.

Public expenditure as percentage of GDP is also related with increases in the Gini coefficient. This result coincides with findings in Ocampo et al. (1998) that explain this is probably due to the fact that labor demand by the public sector is biased towards high skill levels. Nevertheless, public consumption might have a progressive effect on income distribution in the long run if it is destined to human capital investment.

From the results presented in Table 7 one can also infer that growth in exports as percentage in GDP leads to an increase in the Gini coefficient. This result might be showing that exports are not unskilled labor intensive as one would think, but on the contrary are physical or human capital intensive and thus have widened wage inequality[14]. In fact, the composition of Colombian exports can be described as unskilled intensive when exporting to the developed countries, but physical and human capital intensive when speaking about intra-regional trade. Additionally, the results presented in Table 7 indicate a clearly progressive effect of a real depreciation of the currency[15]. Finally, capital inflows exhibit a regressive but quite small effect on income distribution. Capital inflows have allowed skill complementary investment which is in turn one of the main reasons for the increase in the wage gap, and thus, of the increase in income inequality.

Table 7
INCOME INEQUALITY AND STRUCTURAL ADJUSTMENT
1980:01 - 1996:04

	Eq. (1)	Eq. (2)
Dependent variable->	Gini Coefficient Household Income	Gini Coefficient Labor Income
Constant	0.4529	0.3749
	(22.95) ***	(13.69) ***
Private Investment / GDP	0.2111	0.3770
	(2.47) **	(3.24) ***
Public Expenditure / GDP	0.2598	0.2500
	(4.29) ***	(3.67) ***
Exports / GDP	0.096	0.1507
	(1.71) *	(2.23) **
Real Exchange Rate	-0.0514	-0.0472
	(-2.63) **	-1.72 *
Capital Inflows	0.0037	0.0044
	(2.25) **	(1.92) **
R^2	0.6907	0.7634
DW	1.90	1.88
Number of observations	48	48
Method of estimation	OLS	AR1

Very similar results are obtained when using the Gini coefficient measured by total labor income. In conclusion, the increases in private investment, public expenditure, exports, capital inflows and currency overvaluation have resulted in greater inequality in Colombia.

Table 8 shows a similar exercise using annual data from 1976 to 1996. These results indicate that the reduction in tariff and non-tariff restrictions[16] have been related to increases in the Gini coefficient measured by both labor income and total household income. Based on this measure, one can conclude that trade opening has resulted in greater inequality. The channel of this effect is twofold. First, it might be showing that physical and human capital intensive exports are very important in the Colombian trade composition. Second, the skill complementary investment allowed by the tariff reduction generated a substitution of unskilled for skilled employment that significantly increased wage inequality.

Table 8
INCOME INEQUALITY AND STRUCTURAL ADJUSTMENT
1976 - 1996

	Eq. (1)	Eq. (2)
Dependent variable->	Gini Coefficient Household Income	Gini Coefficient Labor Income
Constant	0.4411	0.4167
	(16.10) ***	(14.12) ***
Tariff and non-tariff restrictions	-0.0530	-0.0929
	(-2.33) **	(-3.79) ***
Public Expenditure / GDP	0.4050	0.2854
	(2.31) ***	(1.51)
Growth in GDP	0.7598	0.9131
	(5.73) ***	(6.39) ***
Real Exchange Rate	-0.1117	-0.1279
	(-4.88) ***	(-5.19) ***
Inflation	0.3014	0.3468
	(4.71) ***	(5.04) ***
R^2	0.7584	0.8264
DW	1.72	1.89
Number of observations	20	20
Estimated by OLS		

Again, the increase in public expenditure from an average 11% of GDP between 1977 and 1990 to 15% between 1991 and 1996 was related to increases in the Gini coefficient. Additionally, growth in GDP has a regressive effect. This result coincides with Ocampo et al. (1998). According to these authors this result might be due to the effect of growth on non-labor income. As shown in section 3, non-labor income is highly concentrated.

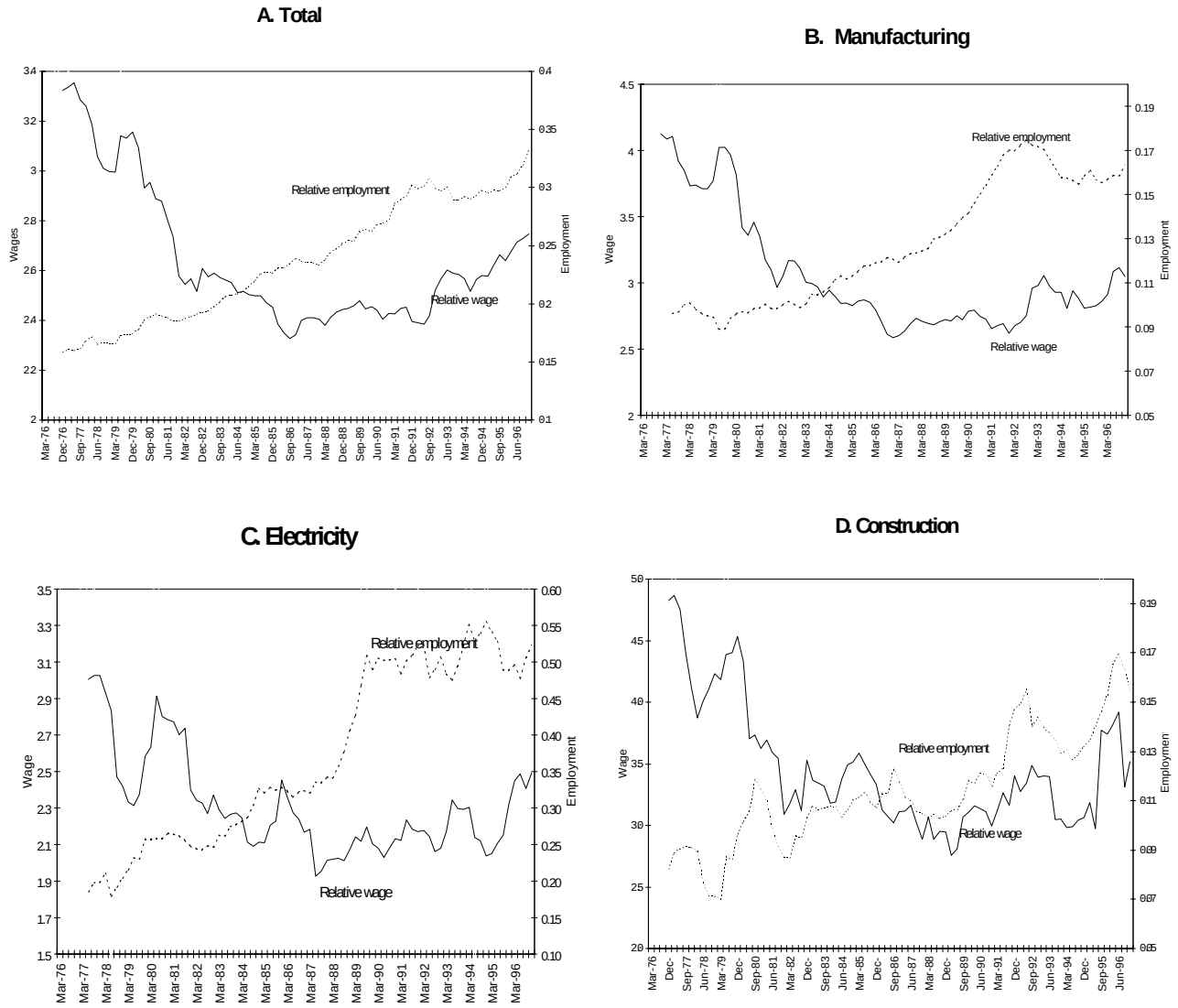
Just as in the exercise presented before, deterioration in income distribution is related to currency overvaluation. Finally, the inflation rate has a regressive effect on income distribution as shown in Table 8. This evidence suggests that the inflation tax is regressive in Colombia, possibly due to the fact that the earnings of the poor are less indexed than for other income groups. Also, groups at the higher end of the income distribution scale can protect themselves against inflation acquiring real assets, a possibility that is less feasible for the poor. Both of these results coincide with Bernal et al. (1997) who analyze in detail the relation between macroeconomic performance and inequality in Colombia.

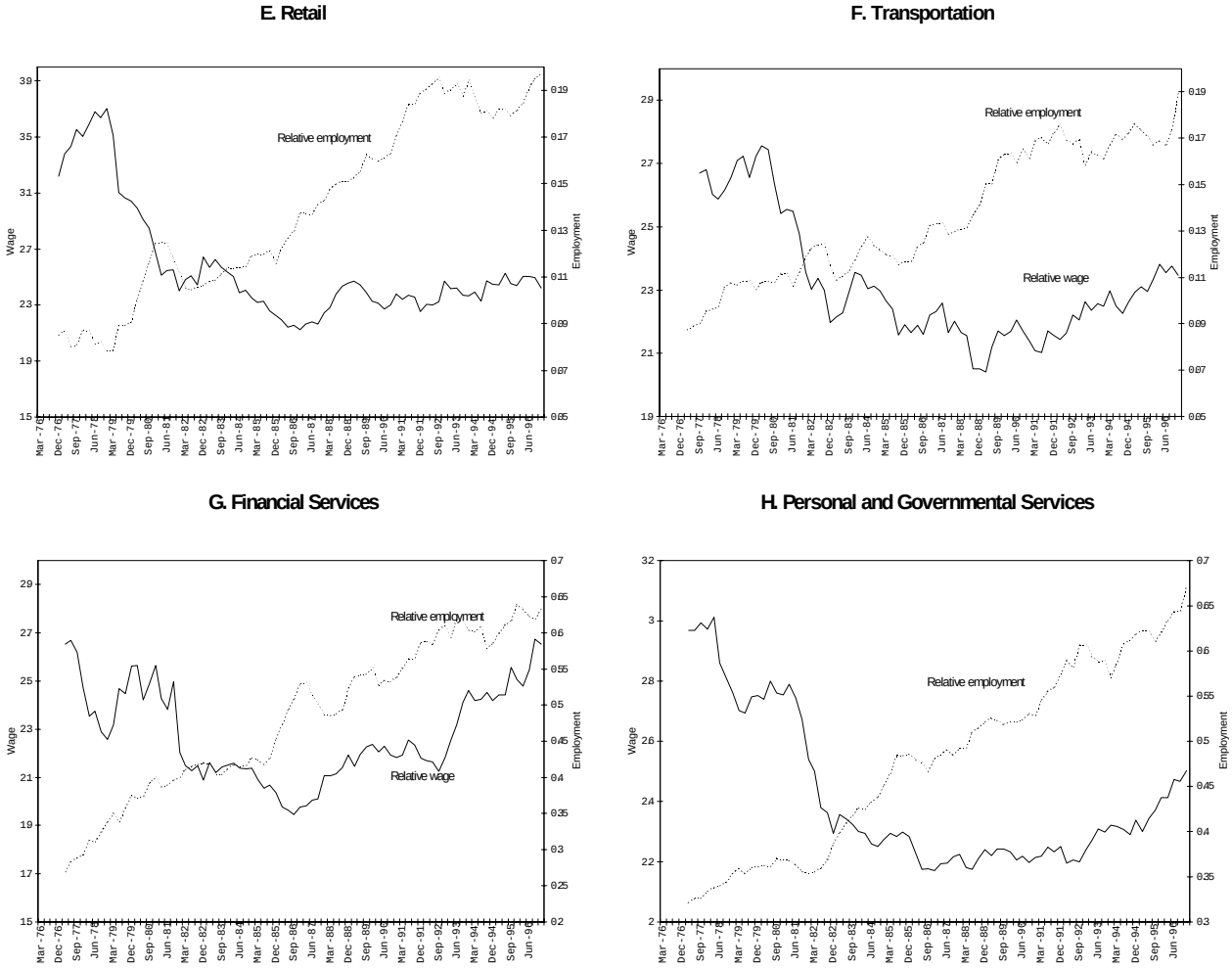
In this section we have seen how income concentration has been closely related to the recent increase in wage differentials between skilled and unskilled workers. In the next section we analyze this stylized fact in detail in order to get a better understanding of the evolution of income distribution since 1991 in Colombia.

VI. EVOLUTION OF WAGE DIFFERENTIALS IN COLOMBIA

Figure 12 shows the evolution of relative wages and relative employment for the more educated workers (12 years of schooling relative to the rest). The figure depicts these variables for total urban economy and seven sectors: (1) Manufacturing, (2) Electricity and gas, (3) Construction, (4) Retail, restaurants and hotels, (5) Transportation and communications; (6) Financial services and (7) Personal and governmental services. Overall trends indicate a steady increase in relative employment, while relative wages decreased until the mid-1980s and have increased thereafter (especially after 1992).

Figure 12



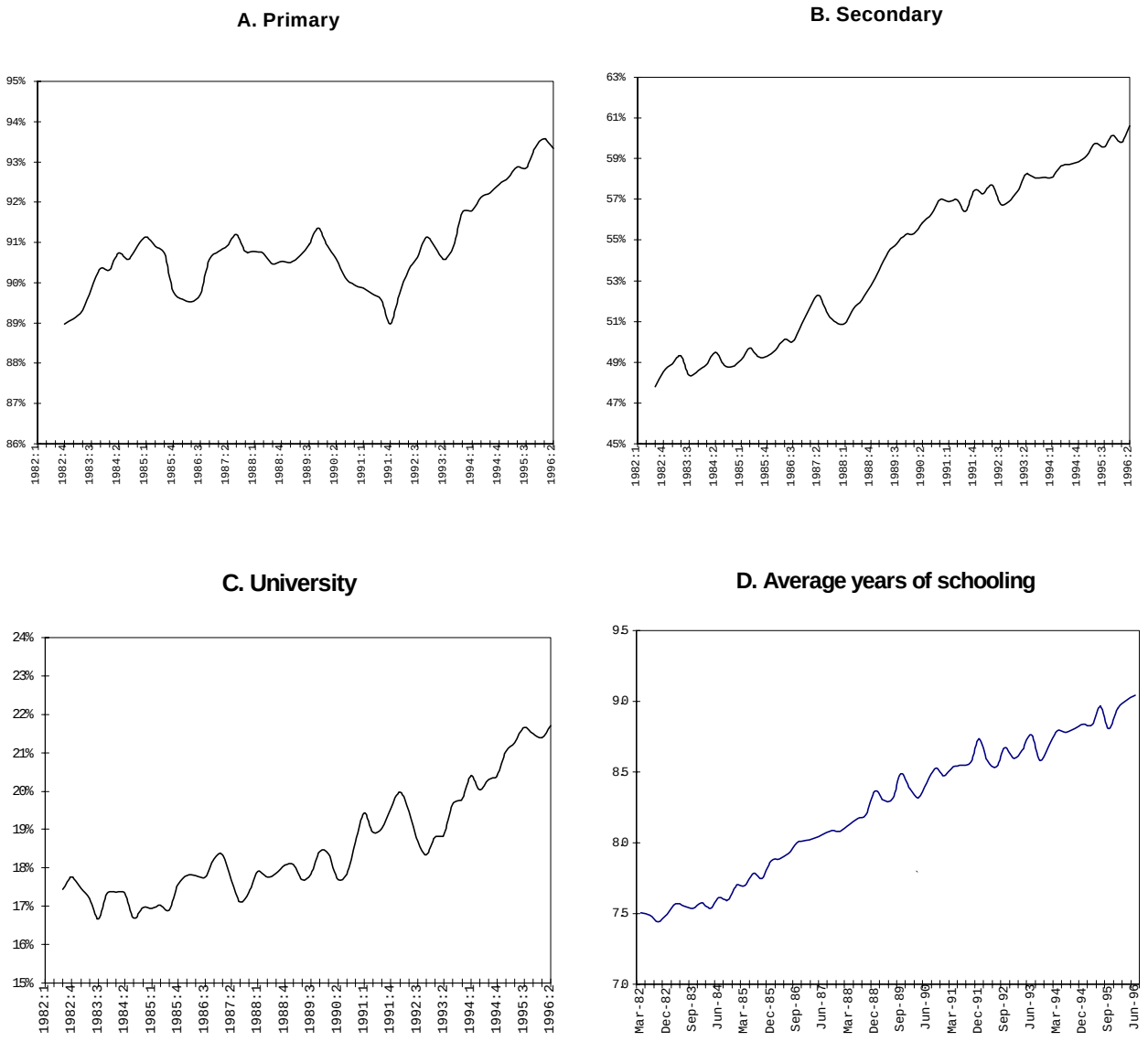


In particular, the share of those workers with less than a high school degree declined significantly between 1976 and 1996, while the share of high school graduates has increased nearly three-fold from 9% of the employed population in 1976 to 25% in 1996. The share of college graduates has also gone up from 5% in 1976 to 11% in 1996. Nevertheless, sectorial data show that sharp changes in relative employment and relative wages have taken place in transportation, financial services and personal and government services. Which means that much of the recent increase in wage differentials is related to changes occurring in the nontraded sector of the economy.

At the same time, relative supply of skilled employment has increased steadily since 1976 as can be seen in Figure 13. In fact, quarterly gross enrollment rates in primary, secondary, and tertiary education showed great progress. Enrollment rates in all educational levels have increased significantly after the reforms. Indeed, the average schooling for the urban population increased by more than 3 years in two decades, more than what was observed in other Latin

American countries. Despite this fact, relative wages have experienced significant increases since 1991, which means that the increase in the relative demand for skilled labor outpaced the increase in relative supply. Therefore, changes in relative demand must have played an important role in the explanation of changes of education wage differentials.

Figure 13
EDUCATION ENROLLMENT RATES AND AVERAGE YEARS OF SCHOLLING



1. Changes in Relative Supply of and Demand for Skills

To analyze this hypothesis we use a two-factor framework following Autor et al. (1997) that assumes an inelastic short-run relative supply function and a downward sloping relative demand function. This methodology uses a simple CES technology with two factors, skilled and unskilled labor, to draw inferences about the rate of growth in relative demand for and supply of skilled workers, based on information on relative wage bill and changes in relative wages. If we assume that the economy operates on the labor demand curve, the following relationship must hold:

$$\log(w_{st}/w_{ut}) = 1/\sigma\left[D_t - \log(x_{st}/x_{ut})\right] \qquad (2)$$

where (x_{st}/x_{ut}) is the relative supply of skilled (s) to unskilled (u) employment in year t, (w_{st}/w_{ut}) relative wages, σ is the aggregate elasticity of substitution between skilled and unskilled workers and D_t indexes the log relative demand shifts for skilled workers. Solving for D_t and rearranging terms:

$$D_t = \log(w_{st}x_{st}/w_{ut}x_{ut}) + (\sigma - 1)\log(w_{st}/w_{ut}) \qquad (3)$$

We estimated changes in log relative demand for skilled workers based on equation (3) using data from the Household Surveys. The results are presented in Table 9. This exercise assumes that workers with less than 12 years of schooling are unskilled, and workers with 12 or more years of schooling are skilled. There is little evidence on the elasticity of substitution between more educated and less educated workers in Colombia. Cárdenas and Bernal (1998) estimate this elasticity using sectorially disaggregated data from the household surveys. Their measurement ranges from 0.5 to 2.0, depending on the sector.

Table 9
SKILLED AND UNSKILLED WORKERS WAGE-BILL SHARES, SUPPLY AND DEMAND SHIFTS, 1976-1996

A. Changes in relative wages, wage bill and supply for more educated workers (100*annual log changes)				
	Relative wage	Relative wage bill	Relative supply change	
1976 - 1981	-1.67	-0.79	0.88	
1981 - 1986	-0.52	1.82	1.31	
1986 - 1991	-0.51	0.72	1.24	
1991 - 1996	0.89	1.61	0.72	
B. Implied relative demand shifts favoring more educated workers				
	$\sigma = 0.5$	$\sigma = 1$	$\sigma = 1.5$	$\sigma = 2$
1976 - 1981	0.04	-0.79	-1.62	-2.46
1981 - 1986	1.57	1.82	2.08	2.33
1986 - 1991	0.98	0.72	0.46	0.21
1991 - 1996	1.16	1.61	2.05	2.50

Source: National Household Survey and own calculations.

The table summarizes the results presenting five year average changes in relative wage bills and relative wages from 1976 to 1996. The log relative supply change is given by the log relative wage bill change minus the log relative wage change and is shown in Panel A. Annual growth rates were 1.31% between 1981 and 1986, and 1.24% from 1986 to 1991. The rate of growth in the relative supply of skilled workers has decelerated during the 1990s.

On the other hand, panel B shows the implied growth of the relative demand for skilled workers for different values of σ. Relative demand for skilled workers declined from 1976 to 1981. It then increased significantly between 1981 and 1986, and then stabilized until 1991. Then, the sharp increase in relative wages between 1991 and 1996 can be related to the deceleration of the rate of growth in relative supply and the acceleration of relative demand growth.

2. Empirical Evidence to Explain Changes in Relative Demand

Trade and technology have been the main explanations of shifts in relative demands in favor of more-educated workers. The relative importance of trade and technology as a cause of growing income inequality is a matter of dispute. According to the evidence for industrial countries[17], it is probably safe to conclude, along the lines of Freeman (1995) and Richardson (1995), that trade matters but that it is not the only force at play, and likely not the most important one.

The argument that observed changes in intrasectoral skill intensities are due to new technology has been supported by various empirical studies surveyed in Mishel and Bernstein (1994). International evidence has shown that industries with more pervasive computer usage show greater increases in skill intensity. In practice, it is very difficult to separate trade from technology as a cause of growing income inequality. Generally, employers are forced by foreign competition to adopt new technologies that save unskilled labor. For this reason, it is probably safe to include both factors as possible explanations of recent changes in wage differentials.

In this section we estimated a model of the determinants of relative wages using a panel of 93 manufacturing sectors for the period between 1978 and 1994. In particular, we estimated:

$$\omega_{it} = a_0 + \alpha k_{it} + \beta y_{it} + \gamma \tau_{it} + \varepsilon_{it}, \qquad (4)$$

where i denotes sectors and t the year, ω is the log of the relative wage, k is a measure of skill biased technological progress, y is production, and τ is the nominal tariff. In turn, the error term can be decomposed into:

$$\varepsilon_{it} = f_i + \delta_t + \mu_{st}, \qquad (5)$$

where f_i is the sector-specific component, δ_t is the time-specific component, and μ_{it} is an i.i.d. error; f_i captures the unobserved characteristics that are specific to each sector which are time invariant and δ_t captures the shocks that are common to all sectors at each point in time. OLS can be used if the intercept and the error ε_{it} are common to all sectors. If the intercept is sector-

specific it is necessary to introduce the term f_i in the equation. In this case it is necessary to use fixed effects by adding a dummy variable for each sector.

Table 10 shows the basic results of an equation that includes overall net investment, investment in machinery and equipment, investment in administration equipment, production, and nominal protection as regressors. The null hypothesis of common intercepts can be rejected a high levels of confidence so fixed effects are used[18]. The results are straightforward and indicate that investment (as a percentage of production) increases relative wages of nonproduction workers. The reason is that new technologies are embodied in capital goods that are skill complementary. Thus, investment raises the relative demand for more-educated workers and increases their relative wages. The effect is quantitatively larger for investment in administrative equipment, which includes computers. In fact, a one-percentage point increase in this type of investment (as a share of total production) increases relative wages by 18%.

Table 10
INDUSTRIAL PANEL ESTIMATIONS (LEVELS)
1978-1994

	Eq. (1)	Eq. (2)	Eq. (3)	Eq. (4)
Dependent variable-> Log(Relative wages)				
Constant	-	-	-	-
Dummy 92-94	0.1400	0.1402	0.1387	(0.17)
	(9.73) ***	(9.74) ***	(9.62) ***	(13.47) ***
Total net investment*	0.0068			
	(1.96) **			
Investment in machinery and equipment*		0.0080		
		(1.85) **		
Investment in administration equipment *			0.1814	0.1800
			(2.14) **	(2.11) ***
Log (Production)	0.0492	0.0489	0.0508	0.0489
	(5.73) ***	5.7 ***	(5.80) ***	(5.55) ***
Nominal tariff	-0.1724	-0.1724	-0.1724	
	(-4.14) ***	(-4.13) ***	(-4.13) ***	
Effective tariff				-6.E-10
				(-0.80)
R^2	0.5356	0.5355	0.5359	0.5304
F - "fixed effects" [H_0: $a_i = a$]	12.96	12.96	12.97	12.66
P-value	(0.00)	(0.00)	(0.00)	(0.00)
Number of observations	1479	1479	1479	1479
* As percentage of production				
Estimated by OLS				

Source: Annual Manufacturing Survey (4-digit classification). Own calculations.

The elasticity of relative wages with respect to production is positive and statistically significant. This means that when production increases, the demand for skilled labor increases more than proportionally. Nominal protection is negatively and significantly correlated with wage differentials[19]. Relatively more protected sectors have lower relative wages. Finally, the dummy variable for the post-reform period indicates that, on average, relative wages have been 14% higher since 1992 as a result of other factors excluded in the regression[20].

Table 11
ESTIMATIONS - NATIONAL HOUSEHOLD SURVEY
1980 - 1996

	Eq. (1)		Eq. (2)		Eq. (3)		Eq. (4)		Eq. (5)		Eq. (6)	
Dependent variable-> Log (Relative wages)	Total		Total		Manufac.		Services		Financial		Retail	
Constant	1.7737		2.4082		4.3812		1.1445		-0.9502		2.4745	
	(3.02)	***	(2.72)	***	(3.96)	***	(1.19)		(-1.00)		(2.66)	***
Log (GDP*)	-0.1269		-0.2590		-0.3345		-0.0259		0.1678		-0.1694	
	(-2.38)	**	(-2.18)	**	(-3.08)	***	(-0.26)		(1.66)	*	(-1.71)	*
Gross Inestment Capital Formation / GDP	0.4522											
	(1.96)	**										
Log (Gross Investment Capital Formation*)			0.1499									
			(1.94)	**								
Log (Government Expenditure*)												
Government Expenditure / GDP	0.9068		0.7717		1.2450		0.4497		0.9179		0.8113	
	(3.12)	***	(3.37)	***	(3.74)	***	(2.00)	**	(1.50)		(1.89)	**
Log (Relative wages (-1))	0.4756											
	(5.09)	***										
R^2	0.4448		0.6501		0.4828		0.5728		0.2457		0.1440	
DW	2.39		2.311		1.93		2.47		1.99		1.96	
Number of observations	68		68		68		68		68		68	
Estimated by	OLS		AR1		AR1		AR1		AR1		AR1	

* constant pesos of 1975

Finally, Table 11 presents the results of time series regressions that include overall net investment, production and government expenditure as possible determinants of relative wages, based on the Household Surveys quarterly data. The regressions suggest that relative wages are countercyclical in the manufacturing sector. For the other sectors, relative wages do not seem to be related to output. As shown before, urban relative wages increase with urban physical capital formation[21]. In fact, a 10 percentage point increase in investment results in a 1.5% increase in relative wages. The elasticity of relative wages with respect to government expenditures is also positive and of similar magnitude. This confirms the results of section 5 that evidence the fact that government expenditures are concentrated on personnel, which in turn is biased toward

relatively more educated workers. For this reason, fiscal expansions are related to greater wage inequality.

In sum, these results indicate that the decrease in the skill premium between 1976 and 1981 was related to the reduction in the relative demand for skilled workers, while the increase in relative wages during the 90s can be attributed to the rapid increase in their relative demand. Additionally, skill complementary technological change has been a key factor behind changes in the relative demand.

VII. CONCLUSIONS

This paper has analyzed the changes in the distribution of income in Colombia since 1976 using data for urban economy (seven largest metropolitan areas) and for the manufacturing sector. Evidence is shown that the structural reforms that took place in the early 1990s have been related to higher income concentration in Colombia, where levels of inequality were already impressively high. The results suggest that both trade liberalization and skill complementary technological change have a positive impact on skill premiums.

Three exercises were done in order to examine the composition and determinants of income inequality. In first place, the decomposition of changes in income concentration over time between and within various groups of interest was analyzed, in particular, groups defined by education, age, region, gender, occupation and sector. Interestingly, the results indicate that differences in education explain a significant portion of the changes in income distribution in Colombia. Differences in occupation have also accounted for an important part of income inequality.

Second, as factors different from characteristics of the individuals at the microeconomic level explained almost a 30% of income inequality, an econometric exercise was carried out to analyze the relationship between structural adjustment and income inequality. The results show that increases in private investment, public expenditure, exports, capital inflows and currency overvaluation have resulted in greater inequality. The reductions in tariff and non-tariff restrictions have been related to increases in the Gini coefficient. As well, the inflation rate showed a regressive effect on income distribution. This evidence suggests that the inflation tax is regressive in Colombia, possibly due to the fact that the earnings of the poor are less indexed than for other income groups. Also, groups at the higher end of the income distribution scale can protect themselves against inflation acquiring real assets, a possibility that is less feasible for the poor.

Finally, in order to get a better understanding of primary income distribution the recent evolution of wage differentials was analyzed by decomposing the relative demand for and supply of skills. Additionally some econometric exercises on the determinants of wage differentials were done. The evidence presented indicates that wage dispersion has increased since the early 1990s. The results indicate that changes in relative demand have been larger than changes in relative supply during the 1990s. Wages of more-educated workers rose in relation to all other educational categories. In the manufacturing sector, wages of nonproduction or white-collar workers increased in relation to production or blue-collar workers.

In turn, the evidence presented suggests that skill complementary technological change has been a key force behind the recent increase in the relative demand for more-educated workers. Much of the change in skill intensity has taken place within specific industries, rather than involving large reallocations between sectors. Trade reform has not resulted in a greater expansion of skill intensive sectors relative to unskilled intensive sectors. Quite the contrary, trade liberalization and other reforms that lowered the user cost of capital and relaxed liquidity constraints, facilitated investment in skill complementary technologies within all sectors of production. Further evidence in this direction is provided by the fact that the largest increases in the relative earnings of the more educated workers took place in the non-traded sectors. The results suggest that both trade liberalization and skill complementary technological change have a positive impact on skill premiums.

BIBLIOGRAPHY ESSAY

Autor, David D., Lawrence F. Katz and Alan B. Krueger (1997) “Computing Inequality: Have Computers Changed the Labor Market,” National Bureau of Economic Research, Working Paper No. 5956, March.

Berman, Eli, John Bound and Zvi Griliches (1994) “Changes in the Demand for Skilled Labor Within US Manufacturing: Evidence from the Annual Survey of Manufactures”, Quarterly Journal of Economics, pp. 109, 367-97, May.

Berman, Eli, John Bound and Stephen Machin (1997) “Implications of Skill-biased Technological Change: International Evidence”, National Bureau of Economic Research, Working Paper No. 6166, September.

Bernal, Raquel, M. Cárdenas, J. Núñez, and F. Sánchez (1997) "Macroeconomic Performance and Inequality", Working Paper Series No. 1, Fedesarrollo.

Borjas, George J. and Valerie A. Ramey (1994) “The Relationship Between Wage Inequality and International Trade”, In Bergstrand, Jeffrey H., Thomas F. Cosimano, John W. Houck and Richard G. Sheehan, edss., *The Changing Distribution of Income in an Open US Economy*, Amsterdam, North Holland, pp. 217-41.

Brauer, D. and S. Hickok (1994) “Explaining the Growing Gap Between Low-Skilled and High-Skilled Wages”, Federal Reserve Bank of New York Research Paper No. 9418, October.

Cárdenas, M. and Carlos Vélez (1996) “Structural Reform, labor markets and income distribution in Colombia: 1989-1994”, mimeo, Fedesarrollo y Banco de la República.

Cárdenas, Mauricio and Catalina Gutiérrez (1996), “Equity and Efficiency effects of Structural Reform in Colombia”, mimeo, Fedesarrollo.

Cárdenas, Mauricio and Raquel Bernal (1998), "Market Regulation and Employment in Colombia : 1976-1996", mimeo, Fedesarrollo.

Davis, Donald R. (1996) “Trade Liberalization and Income Distribution,” National Bureau of Economic Research, Working Paper No. 5693, August.

Feenstra, Robert C. and Gordon Hanson (1994) “Foreign Investment, Outsourcing and Relative Wages” mimeo, University of California at Davis and University of Texas at Austin,

March; forthcoming in *Political Economy of Trade Policy: Essays in Honor of Jagdish Bhagwati*, Cambridge, MIT Press.

Hanson, Gordon H. and Ann Harrison (1994) "Trade, Technology and Wage Inequality: Evidence from México" Manuscript, September.

Hanson, Gordon H. and Ann Harrison (1997) "Who benefits from trade reform? Some remaining puzzles," paper presented at the 10th Annual Inter-American Seminar on Economics, NBER and Centro de Estudios Públicos, Santiago, Chile.

Katz, Lawrence and Kevin M. Murphy (1992) "Changes in Relative Wages 1963-1987: Supply and Demand Factors", *Quarterly Journal of Economics*, 107, pp. 35-78, February.

Leamer, Edward (1994) "Trade, Wages and Revolving Door Ideas", National Bureau of Economic Research, Working Paper No. 4716, April.

Londoño, J.L. (1995) "Distribución del ingreso y desarrollo económico. Colombia en el siglo XX." Banco de la República y Fedesarrollo, Tercer Mundo Editores.

Londoño, J.L. (1996) "La dinámica de cambio de la distribución del ingreso y la pobreza en Colombia en las últimas décadas", Banco Inter Americano de Desarrollo, Washington, mimeo.

Londoño, J.L. (1997) "Brechas Sociales en Colombia", *Revista de la Cepal*, marzo.

Londoño, J.L. (1997) "Sorpresas distributivas después de una década de reformas: América Latina en los noventas", mimeo, Banco Interamericano de Desarrollo, febrero.

Murphy, Kevin and Finis Welch (1991) "The Role of International Trade in Wage Differentials" in: Kosters, M. ed. *Workers and their wages: changing patterns in the United States*. Wahington, D.C. AEI Press.

Núñez, J. and F. Sánchez (1997) "Análisis de Descomposición de la desigualdad de los Ingresos Laborales Urbanos en Colombia", Borrador Preliminar, Departamento Nacional de Planeación.

Nuñez, Jairo y Fabio Sánchez (1998) "Educación y Salarios Relativos en Colombia, 1976-1995. Determinantes, evolución e implicaciones para la distribución del ingreso", Archivos de Macroeconomía, Departamento Nacional de Planeación, 74, enero.

Ocampo, José Antonio (1992) "Reforma del Estado y desarrollo económico y social en Colombia" en E. Amadeo, (ed.): "Estabilidad y reforma estructural en América Latina", Bogotá, TM editores - Fedesarrollo.

Ocampo, J.A., M. Pérez, C. Tovar and F. Lasso (1998) "Macroeconomía, ajuste estructural y equidad en Colombia: 1978-1996", Archivos de macroeconomía, documento No. 79. Departamento Nacional de Planeación.

Revenga, Ana (1994) "Employment and Wage Effects of Trade Liberalization: the Case of Mexican Manufacturing", Paper Prepared for World Bank Labor markets Workshop, July.

Reyes, Alvaro (1987) "Tendencias del empleo y la distribución del ingreso" en J. A. Ocampo y M. Ramírez (ed.): "El problema laboral colombiano. Informes especiales de la Misión de Empleo", Bogotá, Contraloría General de la República - DNP - Sena.

Sachs, Jeffrey and Howard Shatz (1994) "Trade and Jobs in U.S. Manufacturing" *Brookings Papers on Economic Activity*, 1, pp. 1-84.

Sarmiento, Libardo (1992) "La Revolución Pacífica: una mirada premoderna sobre los derechos sociales en Colombia", Economía Colombiana, Contraloría General de la República, Bogotá, # 238, febrero-marzo.

Urrutia, M. (1993) "Distribución del ingreso y la pobreza en Colombia: evolución reciente", *Revista del Banco de la República*, Notas Editoriales, agosto.

Urrutia, M. and A. Berry (1975) "La distribución del ingreso en Colombia", Medellín, La Carreta.

STATISTICAL ANNEX

Appendix 1
FACTOR SUPPLIES

Date	Human capital 15+ (90=100)	Human capital 12+ (90=100)	Human capital 12+ (bodies)	Unskilled labor 15- (90=100)	Unskilled labor 11- (90=100)	Unskilled labor 11- (bodies)	Capital Stock (const 1975)	K (1990=100)
1976:1	36.09	33.87	904898	31.33	34.16	497,298		
1976:2	35.67	35.11	937889	33.47	35.36	514,788		
1976:3	35.88	35.26	941904	31.07	33.99	494,779		
1976:4	37.45	36.56	976573	33.43	36.92	537,501		
1977:1	39.77	38.44	1026756	30.33	34.24	498,410	699108.6	52.56
1977:2	41.96	39.20	1047238	33.43	36.32	528,647	707728.8	53.21
1977:3	41.19	39.58	1057407	35.21	38.62	562,209	718737.6	54.03
1977:4	47.60	43.19	1153649	34.94	39.53	575,446	729125.0	54.81
1978:1	41.96	39.76	1062149	36.51	40.28	586,372	734825.1	55.24
1978:2	29.57	27.67	739273	42.44	48.72	709,238	743802.9	55.92
1978:3	43.13	42.19	1126954	39.26	43.18	628,629	754909.8	56.75
1978:4	42.38	42.14	1125598	39.93	42.89	624,311	764951.0	57.51
1979:1	41.79	42.04	1122881	40.46	42.64	620,736	771335.9	57.99
1979:2	49.90	45.63	1218964	34.83	38.97	567,256	781783.3	58.77
1979:3	43.93	41.19	1100290	40.96	47.00	684,114	793953.5	59.69
1979:4	52.71	48.09	1284744	40.49	45.08	656,156	805426.0	60.55
1980:1	44.95	44.80	1196830	45.32	48.91	712,045	814284.6	61.22
1980:2	46.86	39.24	1048292	42.83	54.68	795,919	824329.9	61.97
1980:3	45.84	45.25	1208774	46.07	50.61	736,765	834909.1	62.77
1980:4	42.94	43.88	1172241	51.93	54.42	792,144	846733.0	63.66
1981:1	47.27	43.59	1164405	44.85	51.80	754,004	858337.2	64.53
1981:2	38.46	38.33	1023816	53.29	59.07	859,827	869757.1	65.39
1981:3	45.63	44.16	1179535	50.43	53.01	771,727	881840.8	66.29
1981:4	45.89	43.38	1158906	59.69	63.78	928,380	895733.0	67.34
1982:1	54.04	51.35	1371679	55.74	58.88	857,103	908838.8	68.32
1982:2	51.14	51.21	1367984	65.42	68.44	996,233	921879.6	69.30
1982:3	49.86	47.82	1277443	66.10	68.60	998,608	934767.3	70.27
1982:4	55.14	53.53	1429900	63.80	65.71	956,548	947997.0	71.27
1983:1	52.34	51.79	1383493	66.42	68.44	996,223	960500.4	72.21
1983:2	53.53	52.88	1412531	66.41	69.73	1,015,074	974538.0	73.26
1983:3	52.77	54.68	1460695	66.72	68.38	995,366	987206.2	74.22
1983:4	59.92	58.37	1559199	65.25	69.88	1,017,213	1000465.0	75.21
1984:1	54.96	53.95	1441286	66.85	70.95	1,032,780	1012591.4	76.12
1984:2	56.53	56.35	1505344	67.16	71.60	1,042,252	1025876.4	77.12
1984:3	60.60	58.38	1559521	67.03	71.88	1,046,347	1038958.1	78.11
1984:4	62.44	61.93	1654417	70.71	75.64	1,101,015	1051621.0	79.06
1985:1	61.18	62.33	1665137	71.94	74.01	1,077,284	1062702.4	79.89
1985:2	56.25	57.37	1532444	69.05	72.66	1,057,736	1075121.9	80.83
1985:3	58.83	59.40	1586655	74.04	77.45	1,127,484	1087691.4	81.77
1985:4	62.24	62.54	1670606	74.05	77.44	1,127,287	1101720.0	82.82
1986:1	58.92	60.27	1609954	80.44	83.99	1,222,625	1113642.1	83.72
1986:2	64.08	64.74	1729450	79.67	80.65	1,173,945	1127145.6	84.74
1986:3	66.60	65.29	1744010	76.78	80.98	1,178,879	1136430.4	85.43
1986:4	76.63	77.30	2064950	76.59	77.21	1,123,911	1144834.0	86.07

Appendix 1
FACTOR SUPPLIES

Date	Human capital 15+ (90=100)	Human capital 12+ (90=100)	Human capital 12+ (bodies)	Unskilled labor 15- (90=100)	Unskilled labor 11- (90=100)	Unskilled labor 11- (bodies)	Capital Stock (const 1975)	K (1990=100)
1987:1	71.12	68.85	1839197	80.68	82.28	1,197,789	1157017.6	86.98
1987:2	74.42	70.33	1878656	82.16	85.32	1,242,037	1170396.5	87.99
1987:3	73.40	72.18	1928079	85.15	86.50	1,259,174	1180806.2	88.77
1987:4	79.21	75.12	2006715	85.57	87.80	1,278,106	1193447.0	89.72
1988:1	80.64	83.28	2224608	94.07	94.94	1,381,987	1203906.9	90.51
1988:2	87.76	88.36	2360296	94.43	96.55	1,405,393	1216227.5	91.43
1988:3	86.52	87.76	2344313	96.39	96.93	1,410,973	1228936.1	92.39
1988:4	101.61	97.06	2592665	89.96	92.08	1,340,343	1240900.0	93.29
1989:1	91.04	89.15	2381414	99.32	100.10	1,457,203	1257536.5	94.54
1989:2	102.02	93.10	2486859	95.24	99.44	1,447,463	1274627.8	95.82
1989:3	107.75	104.39	2788549	95.15	96.31	1,402,016	1286825.5	96.74
1989:4	96.90	96.74	2584255	104.30	103.28	1,503,428	1297051.0	97.51
1990:1	99.27	95.57	2553049	96.68	98.17	1,429,106	1312964.2	98.71
1990:2	98.77	100.03	2672127	99.16	97.60	1,420,764	1325302.4	99.63
1990:3	99.90	102.34	2733807	99.72	100.10	1,457,111	1337505.8	100.55
1990:4	102.06	102.06	2726209	104.44	104.13	1,515,758	1344954.0	101.11
1991:1	111.35	115.12	3075151	102.36	102.40	1,490,622	1354338.4	101.82
1991:2	113.56	115.43	3083419	101.13	98.81	1,438,383	1364225.4	102.56
1991:3	102.26	109.50	2925061	108.63	106.94	1,556,739	1370583.2	103.04
1991:4	114.07	116.89	3122521	107.85	107.90	1,570,724	1377367.0	103.55
1992:1	113.68	118.36	3161870	104.74	105.09	1,529,751	1387960.7	104.34
1992:2	118.06	121.32	3240816	104.69	105.38	1,534,064	1398765.9	105.16
1992:3	138.51	140.47	3752320	102.69	99.32	1,445,734	1411769.2	106.13
1992:4	135.84	130.82	3494675	102.07	100.57	1,463,917	1422270.0	106.92
1993:1	132.27	130.51	3486264	102.42	101.64	1,479,549	1437675.5	108.08
1993:2	141.78	139.19	3718233	97.75	101.13	1,472,187	1456338.1	109.48
1993:3	124.60	119.97	3204801	114.63	114.24	1,662,959	1474171.8	110.82
1993:4	137.89	137.93	3684515	104.63	102.64	1,494,072	1490322.0	112.04
1994:1	131.48	134.39	3589875	111.55	108.13	1,573,999	1511287.5	113.62
1994:2	131.33	133.25	3559398	104.92	107.68	1,567,529	1533819.0	115.31
1994:3	139.34	140.84	3762315	108.10	105.81	1,540,196	1555795.4	116.96
1994:4	146.24	149.08	3982242	107.32	103.90	1,512,401	1571141.0	118.11
1995:1	146.07	140.99	3766345	104.61	106.38	1,548,513	1595307.6	119.93
1995:2	149.95	149.21	3985951	106.30	105.67	1,538,231	1619940.0	121.78
1995:3	153.59	150.56	4022000	96.64	99.90	1,454,162	1644518.2	123.63
1995:4	163.02	156.72	4186420	106.14	108.30	1,576,504	1670386.0	125.58
1996:1	156.57	153.72	4106437	110.50	108.82	1,584,114	1693767.2	127.33
1996:2	164.52	160.42	4285389	100.03	99.61	1,449,942	1716162.1	129.02
1996:3	156.59	154.70	4132601	96.77	99.07	1,442,134	1739989.6	130.81
1996:4	171.14	174.96	4673786	102.73	102.26	1,488,600	1763080.8	132.54
1997:1	168.55	167.37	4471016	105.30	104.87	1,526,519		
1997:2	211.02	215.78	5764132	93.81	90.36	1,315,417		

Appendix 1
FACTOR RETURNS

Date	Rate of return to capital	Unskilled wages 11-	Skilled wages 12+	Unskilled wages 15-	Skilled wages 16+	Relative wage 12+	Relative wages 16+	nominal interest rate	inflation rate	real interest rate
1976:1		2,329	8,594	2,481	11,094	3.69	4.47	22.40	17.67	4.02%
1976:2		2,174	7,804	2,336	9,883	3.59	4.23	23.20	17.17	5.15%
1976:3		2,237	8,389	2,406	11,011	3.75	4.58	23.10	21.54	1.28%
1976:4		2,365	8,493	2,532	11,223	3.59	4.43	20.80	24.54	-3.00%
1977:1		2,435	9,191	2,613	12,469	3.77	4.77	15.70	27.13	-8.99%
1977:2		2,700	9,796	2,878	12,661	3.63	4.40	20.80	37.59	-12.20%
1977:3		2,808	9,829	2,998	12,895	3.50	4.30	29.00	35.02	-4.46%
1977:4		3,192	10,951	3,365	14,676	3.43	4.36	26.20	29.28	-2.38%
1978:1		3,325	11,112	3,529	14,607	3.34	4.14	25.40	24.86	0.43%
1978:2		3,554	10,562	3,704	14,008	2.97	3.78	26.20	16.36	8.46%
1978:3		3,642	11,883	3,881	15,704	3.26	4.05	21.90	14.66	6.32%
1978:4		4,049	13,317	4,336	17,248	3.29	3.98	29.90	18.24	9.86%
1979:1		4,456	14,754	4,788	18,792	3.31	3.92	35.70	22.19	11.06%
1979:2		4,710	17,337	5,002	23,060	3.68	4.61	34.60	22.98	9.45%
1979:3		4,916	15,415	5,169	20,931	3.14	4.05	33.30	25.74	6.01%
1979:4		5,158	17,429	5,443	22,990	3.38	4.22	42.50	28.01	11.32%
1980:1		5,760	17,546	6,133	22,813	3.05	3.72	32.10	26.10	4.76%
1980:2	0.234	5,684	16,102	5,784	23,539	2.83	4.07	32.60	27.55	3.96%
1980:3	0.245	6,299	18,917	6,680	24,960	3.00	3.74	35.67	26.32	7.40%
1980:4	0.274	6,815	19,547	7,255	24,654	2.87	3.40	36.45	26.23	8.10%
1981:1	0.258	7,502	22,721	7,842	30,891	3.03	3.94	36.15	27.52	6.77%
1981:2	0.266	8,363	21,826	8,759	28,676	2.61	3.27	35.90	26.31	7.60%
1981:3	0.285	7,999	23,875	8,469	29,846	2.98	3.52	38.21	28.92	7.20%
1981:4	0.303	8,093	21,247	8,444	26,652	2.63	3.16	39.01	26.59	9.81%
1982:1	0.300	9,384	27,176	9,890	34,109	2.90	3.45	39.12	25.21	11.11%
1982:2	0.305	11,257	30,560	11,895	38,194	2.71	3.21	38.68	25.22	10.75%
1982:3	0.284	11,334	30,484	11,895	37,267	2.69	3.13	37.51	23.82	11.06%
1982:4	0.281	11,456	32,572	12,114	39,920	2.84	3.30	36.70	24.69	9.63%
1983:1	0.280	12,749	34,433	13,462	42,290	2.70	3.14	35.02	22.27	10.43%
1983:2	0.263	13,223	35,614	13,937	44,587	2.69	3.20	33.28	21.72	9.49%
1983:3	0.290	13,746	38,420	14,659	47,553	2.79	3.24	33.20	18.53	12.38%
1983:4	0.320	13,811	38,634	14,556	49,415	2.80	3.39	33.28	16.95	13.96%
1984:1	0.346	15,151	41,125	15,951	51,971	2.71	3.26	34.83	16.95	15.29%
1984:2	0.348	15,486	42,019	16,340	53,664	2.71	3.28	34.38	14.92	16.93%
1984:3	0.357	16,032	44,165	16,844	56,341	2.75	3.34	34.97	16.12	16.23%
1984:4	0.352	16,243	43,540	17,111	55,893	2.68	3.27	34.87	16.66	15.61%
1985:1	0.354	17,629	47,779	18,724	59,415	2.71	3.17	35.16	21.13	11.59%
1985:2	0.359	18,564	47,317	19,577	60,116	2.55	3.07	34.86	26.45	6.65%
1985:3	0.391	18,386	47,156	19,376	59,270	2.56	3.06	35.39	24.91	8.39%
1985:4	0.442	19,024	50,155	20,087	63,098	2.64	3.14	35.56	23.55	9.72%
1986:1	0.351	21,139	50,919	22,198	63,945	2.41	2.88	31.76	23.29	6.87%
1986:2	0.395	21,593	55,086	22,821	67,168	2.55	2.94	30.45	17.38	11.14%
1986:3	0.424	23,272	59,730	24,411	75,372	2.57	3.09	31.08	15.69	13.30%
1986:4	0.430	22,957	64,042	24,484	78,603	2.79	3.21	31.68	19.56	10.13%

Appendix 1
FACTOR RETURNS

Date	Rate of return to capital	Unskilled wages 11-	Skilled wages 12+	Unskilled wages 15-	Skilled wages 16+	Relative wage 12+	Relative wages 16+	nominal interest rate	inflation rate	real interest rate
1987:1	0.344	26,080	68,443	27,438	83,294	2.62	3.04	30.69	20.40	8.55%
1987:2	0.337	27,145	70,342	28,375	86,588	2.59	3.05	30.30	22.44	6.43%
1987:3	0.323	27,741	70,809	29,199	86,223	2.55	2.95	30.56	25.64	3.92%
1987:4	0.386	29,128	75,715	30,506	92,309	2.60	3.03	32.50	24.51	6.42%
1988:1	0.365	33,429	86,054	35,503	105,773	2.57	2.98	33.43	25.42	6.39%
1988:2	0.380	34,062	88,249	36,018	109,435	2.59	3.04	36.01	29.05	5.40%
1988:3	0.310	34,533	89,501	36,615	109,271	2.59	2.98	34.41	29.63	3.69%
1988:4	0.309	35,595	98,240	37,518	120,859	2.76	3.22	31.79	28.13	2.86%
1989:1	0.318	40,766	101,880	42,833	123,382	2.50	2.88	32.21	27.14	3.99%
1989:2	0.337	43,990	115,072	45,704	141,740	2.62	3.10	33.14	24.44	6.98%
1989:3	0.333	45,012	119,214	47,416	145,856	2.65	3.08	33.09	25.33	6.18%
1989:4	0.364	45,818	116,704	48,461	139,910	2.55	2.89	33.75	26.60	5.65%
1990:1	0.352	50,929	133,026	53,532	162,164	2.61	3.03	33.75	27.16	5.18%
1990:2	0.369	55,107	144,536	58,626	173,745	2.62	2.96	34.82	28.41	4.99%
1990:3	0.384	56,423	143,213	59,817	176,377	2.54	2.95	35.99	29.33	5.15%
1990:4	0.407	58,664	150,097	62,046	181,737	2.56	2.93	36.79	31.34	4.15%
1991:1	0.361	66,367	169,721	70,523	210,038	2.56	2.98	35.27	31.60	2.79%
1991:2	0.363	68,212	185,352	72,929	222,885	2.72	3.06	34.76	31.22	2.70%
1991:3	0.410	73,573	184,153	78,608	225,396	2.50	2.87	37.98	30.93	5.38%
1991:4	0.374	73,653	183,729	77,937	226,313	2.49	2.90	37.07	28.08	7.02%
1992:1	0.247	82,913	215,251	88,340	267,784	2.60	3.03	30.10	27.29	2.21%
1992:2	0.121	87,872	235,473	93,699	292,952	2.68	3.13	24.45	27.54	-2.42%
1992:3	0.204	91,901	252,931	98,362	303,548	2.75	3.09	24.72	27.66	-2.31%
1992:4	0.221	91,922	264,766	97,735	316,826	2.88	3.24	27.17	25.72	1.16%
1993:1	0.220	105,397	294,928	112,172	358,472	2.80	3.20	25.90	24.57	1.07%
1993:2	0.232	122,000	344,345	129,139	437,860	2.82	3.39	26.01	22.21	3.11%
1993:3	0.206	121,761	317,293	128,158	380,620	2.61	2.97	24.72	20.99	3.08%
1993:4	0.236	130,056	373,801	139,340	452,062	2.87	3.24	25.56	22.23	2.73%
1994:1	0.198	142,689	383,129	152,624	459,318	2.69	3.01	25.42	22.99	1.98%
1994:2	0.242	151,216	408,267	160,597	518,185	2.70	3.23	26.59	23.63	2.39%
1994:3	0.281	156,024	439,341	167,177	531,802	2.82	3.18	30.32	22.46	6.42%
1994:4	0.379	152,843	450,385	165,025	542,702	2.95	3.29	35.73	22.38	10.91%
1995:1	0.335	169,603	481,172	179,442	596,147	2.84	3.32	33.91	21.06	10.62%
1995:2	0.308	181,113	514,425	193,207	631,105	2.84	3.27	34.83	21.38	11.08%
1995:3	0.275	186,840	569,131	199,353	725,877	3.05	3.64	29.80	21.12	7.16%
1995:4	0.337	186,268	533,577	196,793	664,744	2.86	3.38	30.81	20.04	8.98%
1996:1	0.339	197,253	549,683	209,584	664,131	2.79	3.17	33.09	20.45	10.50%
1996:2	0.239	210,881	625,222	224,700	766,832	2.96	3.41	32.60	19.78	10.71%
1996:3	0.246	210,222	635,159	224,596	805,637	3.02	3.59	30.41	21.01	7.77%
1996:4	0.221	211,673	615,563	227,141	771,209	2.91	3.40	28.42	21.84	5.40%

Appendix 2
ANNUAL SERIES

Date	Labor	Capital and	Social Sector spending by the Government (%GDP)						Average tariff and
	share	land share	Education	Health	Labor	Agriculture	Housing	Total	non-tariff restrictions
1970	39.03	53.51	1.90	1.74	0.27	0.94	0.47	5.32	41.7%
1971	39.71	53.05	2.12	1.69	0.33	0.81	0.47	5.42	39.2%
1972	39.26	53.84	2.16	1.67	0.28	0.76	0.48	5.35	38.7%
1973	37.82	55.37	2.28	1.91	0.29	0.57	0.57	5.62	38.5%
1974	37.18	55.91	2.03	1.82	0.29	0.90	0.38	5.42	31.1%
1975	37.82	54.36	2.11	1.74	0.26	0.35	0.36	4.82	30.0%
1976	37.12	53.55	1.96	1.75	0.34	0.26	0.32	4.63	30.6%
1977	37.08	52.44	2.03	1.80	0.37	0.39	0.34	4.93	31.8%
1978	39.72	49.40	2.23	1.81	0.36	0.33	0.26	4.99	30.8%
1979	40.95	48.71	2.40	1.77	0.52	0.35	0.23	5.27	30.8%
1980	41.60	48.37	2.40	1.85	0.36	0.40	0.35	5.36	29.8%
1981	42.79	48.76	2.65	2.02	0.37	0.31	0.27	5.62	26.2%
1982	43.13	48.28	2.75	2.06	0.37	0.30	0.35	5.83	25.1%
1983	43.87	47.82	2.83	2.23	0.35	0.34	0.36	6.11	27.3%
1984	43.38	47.27	3.09	2.14	0.34	0.34	0.26	6.17	30.4%
1985	40.62	48.97	2.73	1.89	0.32	0.99	0.20	6.13	40.2%
1986	37.68	49.30	2.58	1.92	0.28	0.53	0.29	5.60	36.0%
1987	37.98	50.31	2.47	1.97	0.30	0.66	0.32	5.72	42.7%
1988	38.07	51.24	2.34	1.91	0.30	0.66	0.26	5.47	38.8%
1989	38.27	51.18	2.43	2.13	0.35	0.73	0.29	5.93	37.6%
1990	37.35	52.81	2.32	2.01	0.34	0.75	0.32	5.74	30.9%
1991	37.52	52.59	2.24	2.08	0.31	0.54	0.44	5.61	17.6%
1992	40.23	50.12	3.30	2.17	0.37	0.67	0.42	6.93	7.4%
1993	39.89	49.27	2.83	2.19	0.50	0.68	0.44	6.64	7.4%
1994	40.58	47.62	2.91	2.29	0.62	0.70	0.46	6.98	7.7%
1995	40.82	47.36	2.69	2.77	0.79	0.63	nd	6.88	7.1%
1996	nd	nd	3.32	3.17	0.83	0.91	nd	8.23	7.9%

Notes

[1] Revenga (1994), and Revenga and Montenegro (1995) have shown similar trend for the case of Mexico.
[2] See for example Murphy and Welch (1991), Katz and Murphy (1992) and Lawrence and Slaughter (1993).
[3] At the 1993 exchange rate, the maximum allowed monthly income (Col$999.998) was equal to US$1,200.
[4] Cárdenas and Vélez (1996) show that these forms of secondary income have played a decisive role on income distribution in Colombia in recent years.
[5] From now on every time we refer to income distribution it is to be understood that it corresponds to urban areas only.
[6] The sum of total income (labor and non-labor) of the household divided by the number of individuals in the household.
[7] See Ocampo et al. (1998) and Leibovich (1998).
[8] In accordance with findings of Leibovich (1998).
[9] Additionally we incorporated a random error with mean equal to zero and variance similar to the sample's in order to avoid the lower variance bias.
[10] See Cowell and Jenkins (1995) for a formal derivation of all Generalized Entropy measures.
[11] This increase in capital formation is consistent with the view that economic growth is higher on average in relatively more open economies (e.g., Edwards (1993), Sachs and Warner (1995) and Sala-i-Martin (1997)).
[12] Human capital is measured by the weighted sum of educated labor (16 years of schooling or more), where the weights are by relative wages.
[13] Quarterly public expenditure is available only since 1980.
[14] Robbins (1995) found the same result for the cases of Costa Rica, Chile and Argentina.
[15] This result coincides with Bernal et al. (1997).
[16] This variable measures the average tariff and the equivalent of non-tariff restrictions. It was calculated by Ocampo (1994).
[17] See among other, Wood (1994 and 1995), Borjas and Ramey (1994), Lawrence and Slughter (1993), Sachs and Shatz (1994) and Berman, Bound and Griliches (1992).
[18] See Judge et al. (1988), p. 475.
[19] Nevertheless, protection is not significant when the effective tariff is used instead of the nominal as shown in Equation 4 in Table 5.
[20] Other variables such as exports as percent of production and real exchange rate were used in the regressions but did not turn out significant.
[21] This variable is not available at the sectoral level.